

# Southern Power & Industry

The Industrial and Power Journal of the South

Southwest



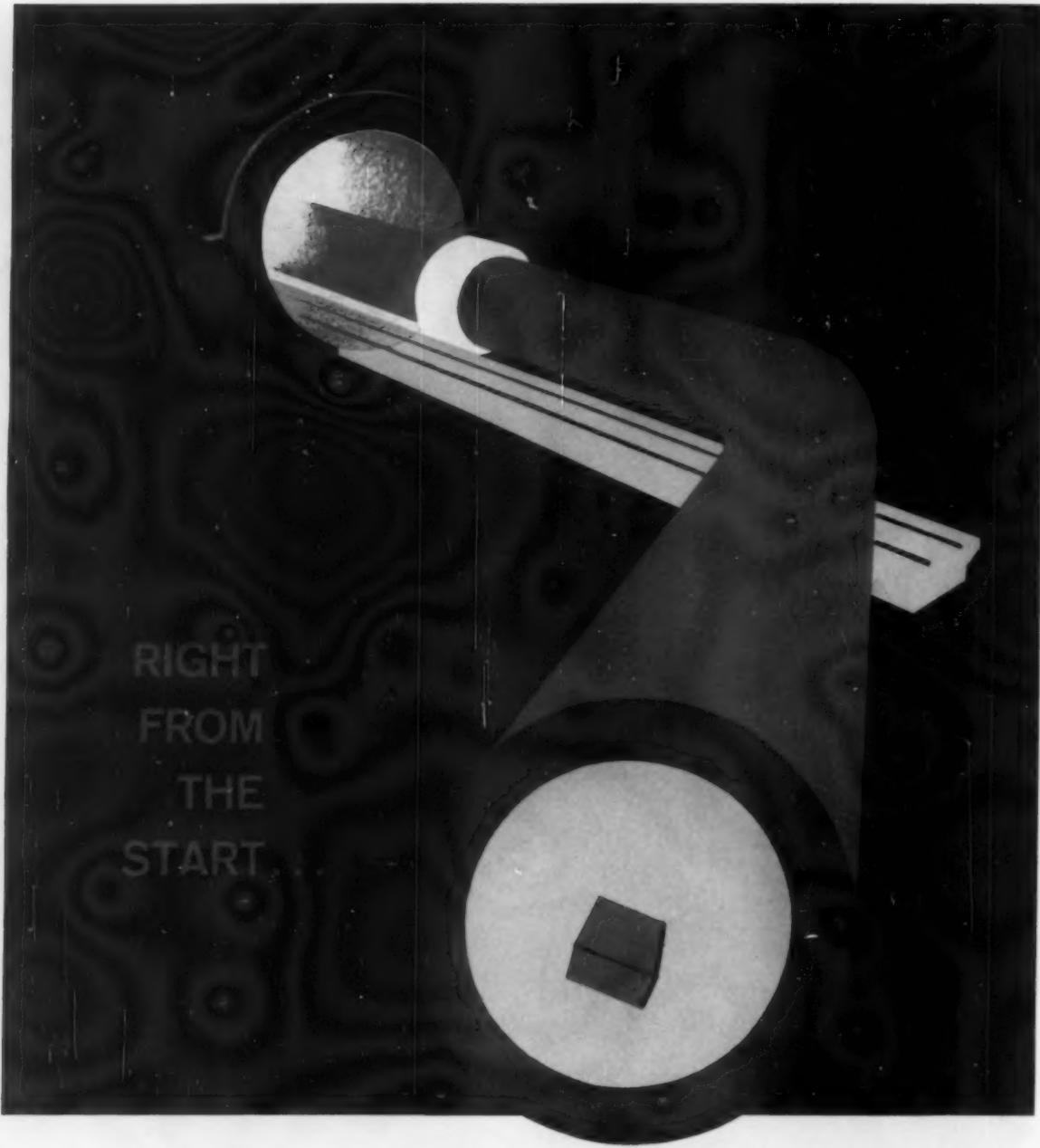
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Plant Cooling — P. 42  
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**MARCH, 1959**

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Volume 77 Number 3

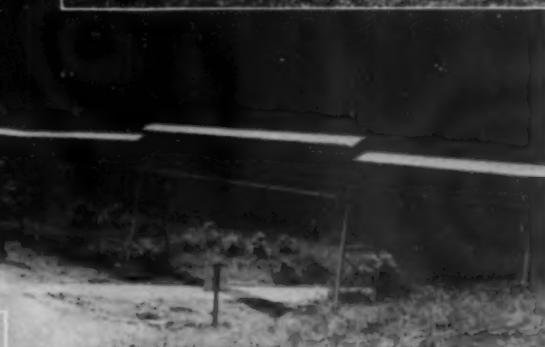
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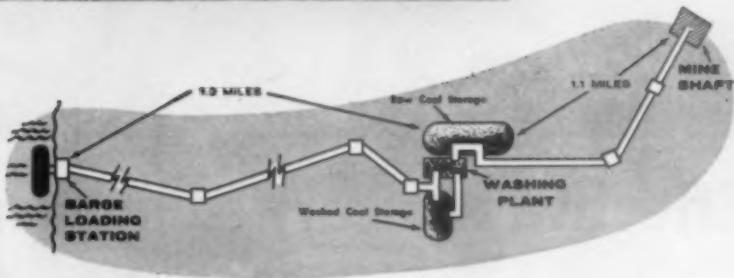
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One of 5 power stations and transfer points.

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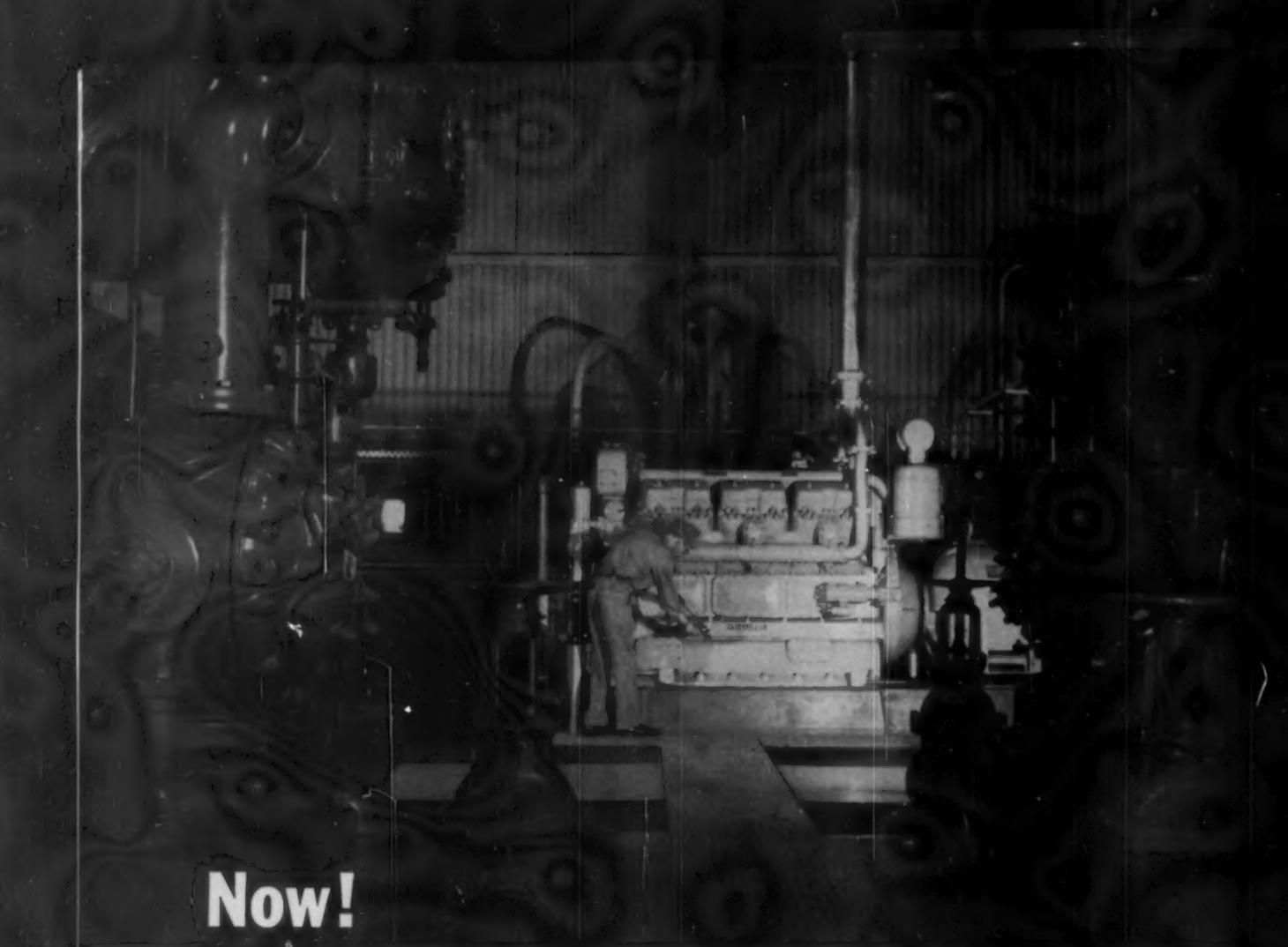
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# Southern Power & Industry

The Industrial and Power Journal of the South and Southwest

Eugene W. O'Brien  
Managing Director

Vol. 77  
No. 3

MARCH, 1959

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# Facts and Trends

March 1, 1959

- ◆ **PHOTOGRAPHIC MEMORY** — Some people claim to have one, but can they remember what they don't see? Too many man-hours are lost in brain-beating, trying to remember job details of a month ago. A year later it's harder.

An article, already on the editor's desk, shows how easily a camera can be used (even in a small plant) to record conditions and events that are important to the plant engineer. Actual techniques and examples are given.

- ◆ **AND WHILE LOOKING AHEAD** — The editors have seen an urgent need for simplified, coordinated information on plastics in the industrial plant. What are the available types? What can each accomplish? How may they be applied to resist corrosion and to meet other plant applications?

We had to go to the scientists to get this article for a coming issue. So far plant engineers are not saying much about plastics.

- ◆ **NEW ADHESIVES** — Epoxies, etc., have already won a place in many fabrication applications. But here again the plant maintenance and service engineers are not talking.

We have all seen the demonstrations lifting a Ford, 2000 lb strength in 40 seconds, etc. But how about service case studies? What the editors want right now are field reports. Tell us what was used, how it was applied. Tell us how these new adhesives are reducing costs and improving performance in your plant. The editors will pay you for your trouble, and pass the facts along to SPI readers.

- ◆ **75th ANNIVERSARY** — The fact is Reliance water level indicators were being sold locally in Cleveland as early as 1884. And the trend indicates continued need for such devices in years to come — atomic power notwithstanding.

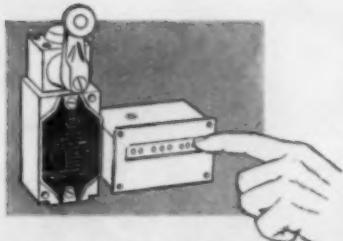
- ◆ **HOW IS YOUR ELECTRICAL EQUIPMENT?** — An advertisement in this issue tells how you can find out. A big company thinks your circuits and devices may need expert attention.

They are convinced that many, maybe most plants, would use the help of specialists more extensively if they could. So, be thinking about a mobile test lab, complete with technicians and repair men that can serve your plant regularly on a contract basis. Very soon such service will be available — first in the Southeast, and later throughout the South and Southwest.

- ◆ **ALUMINUM TRANSFORMER** — A joint project of Moloney Elect. Co. and Alcoa. The first unit was displayed in Feb. Aluminum is used for all metal parts except the core and trucks. Radiation is by new aluminum extruded finned tubes.

Allen-Bradley is not satisfied  
until Limit Switch Life  
runs into

# MANY MILLIONS OF OPERATIONS



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tests have run many millions of op-  
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momentary contact mechanism.  
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tacts never need maintenance.  
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insurance against any reduction of  
the contact pressure as the "trip  
point" is approached. This means  
less chance for chatter and arcing  
of relays, contactors, or starters  
operated by the limit switch—and  
prolonged trouble free contact life  
for the limit switch itself.

The Allen-Bradley line of limit switches is complete.  
Illustrated are only a few variations.



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✓ Dirt . . . the most feared enemy of any good anti-friction bearing was damaging many bearings in the maintenance stock at this plant. Our salesman was called and within a short time reorganized their maintenance stocks of bearings and developed a more practical record keeping system.

First—all bearings in stock long enough to be affected by dust were taken to our branch. There, they were thoroughly cleaned, rewound and repackaged to be as dustproof as possible.

Second—all bearings in use were identified by our salesman according to the bearing manufacturers' numbers. By converting the equipment manufacturers' parts

numbers to standard bearing numbers, many bearings purchased from various sources under a variety of parts numbers were found to be identical.

Weeding out these duplicates greatly reduced our customer's purchases for inventory. We now know what bearings the plant uses and make certain stocks for any emergency are carried at our branch. Our customer now installs only factory-fresh bearings from inventory or orders from Dixie Bearings and receives the bearings they need immediately.

Need this kind of service—service with a capital "S"? Just call our nearest branch—no obligation, of course.

### DIXIE BEARINGS, INC.

*Providing bearing service*

*in the South* ➤ **FLORIDA:** Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville

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## Facts and Trends (Continued)

- ◆ SCIENTISTS really are pushing toward that old dream of getting electricity direct from heat without machinery. In fact, it's already being done in a small way at high cost.

And perhaps of greater immediate prospect is getting cooling direct from electricity. It is sort of a thermocouple operating in reverse.

One company already has a full scale "hot-cold-light" panel that responds to a set of dials and changes temperature from 55 to 120 F, all without compressors or conventional heaters.

- ◆ NO CLICKING, NO STICKING — Contact-making devices are being replaced with static devices called "logic units."

See LOGIC CONTROL in this issue. A G-E engineer discusses application for these relatively new aids to better control and tells how they actually perform in G-E's Louisville Plant. Static switching is not cheap, but the more exacting needs of automation are making it important (almost essential) in many plants.

- ◆ DICK PRIESS — Long time Associate Editor of SPI is moving to an important post as our Advertising Manager. Jim Warren has accepted the assignment of Consulting Editor for SPI in the Southwest. He is Vice President of Hiers Engineering Corp. in Dallas, Tex. You will be hearing from all of us. We also want to be hearing from you. Tell us what you want in SPI and help us get it. We depend heavily on our readers to keep us on the "straight and narrow" — see next item.

- ◆ BACK PATTING is permissible when SPI brags about its authors. No technical magazine is closer to its readers — evidenced by a 4-page bulletin (just off the press) that tells who the real editors of SPI are.

You will be interested in this folder because it lists by name and company 85 Southern and Southwestern authors that made SPI's from-the-plant coverage possible in 1958. You may be among them — certainly you will see the names of men you know and respect. WRITE THE EDITORS FOR A COPY.

- ◆ A NEW TYPE OF A-C MOTOR that uses d-c excitation to the stator and two-phase a-c voltage to the armature was described at the recent AIEE meeting in N. Y. "Gives smoothly adjustable speed characteristics of a d-c motor and power factor control characteristics of a synchronous motor." You can't buy it yet.

- ◆ COAL PEOPLE are watching the new 108-mile coal pipeline in eastern Ohio. The \$13,500,000 line is expected to transport more than 1,350,000 tons a year at a transportation savings of over 35%. Coal is pumped as a slurry at about 3 mph.

- ◆ COMPUTER-CONTROLLED plant to be put on stream by Monsanto Chemical Co. in 1959 "will be the first chemical plant to use an electronic computer for direct control of over-all process."

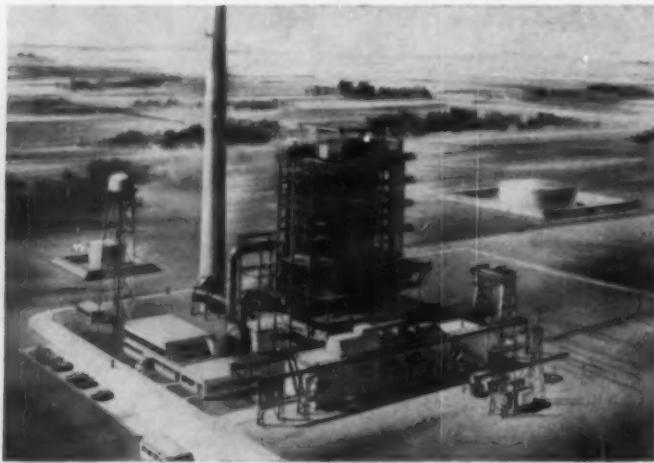
- ◆ PAINTING AND COAL HANDLING — Reprints are available of two special features recently carried in SPI. Each article gives detailed information that should be of direct help to engineers and maintenance supervisors in a great many industrial and power plants. Write the editors for a free copy of either or both articles.

(Continued on Page 31)



# the SOUTH—SOUTHWEST

*more power . . . more plants . . . more money*



**Helena, Arkansas** — Arkansas Power & Light Company plans to construct and operate this huge \$43 million steam electric generating station on the Mississippi River near Helena. Ebasco Services, has the design and construction contract. Station will be equipped with a 325,000 kw Westinghouse turbine generator and a 2,300,000 lb/hr bu B & W boiler. Ultimate capacity, with four generating units, will be approximately 1,500,000 kw. Operation target is March, 1961.

## Poly-Scientific — Va. Expansion

September 1 occupancy is expected for the new building to house the offices and production facilities of the Poly-Scientific Corporation, according to James J. Pandapas, president.

Work on the \$325,000 building has already begun. It will cover approximately 50,000 sq ft of space, including offices, laboratory space for research and development, and production areas. Poly-Scientific manufactures slip rings and brush assemblies and other electro-mechanical devices for use in defense projects and private industry.

Since it was organized in 1953, Poly-Scientific has steadily expanded. Some 225 persons, including a high proportion of graduate engi-

neers, chemists and highly-skilled technicians, now make up a payroll of nearly a million dollars a year. The company presently operates out of four different sites in downtown Blacksburg, Virginia.

## Ky. Plant for Parker-Hannifin

A new 50,000 sq ft facility in Lexington, Kentucky, until recently owned and operated by the Kawneer Company, has been purchased by Parker - Hannifin Corporation of Cleveland. Parker seals for the missile, aircraft, automotive and other industrial markets will be produced. Employment will be around 250.

## Ecsco Expanding to Research Triangle in North Carolina

**Ecsco**, an engineering firm specializing in special test facilities and ground support equipment for missiles and aircraft programs, has taken an option on 10 acres in the Research Triangle Park near Durham, N. C. with a reservation for 10 more acres in a more remote section of the Park.

According to **Stanley Stanick**, President, and **Robert Swaffield**, Vice President, the company expects to begin operations in office space in Durham by spring. A move to the Research Triangle Park will be made upon completion of its facilities there. Initial operations will require 20-30 employees, mostly scientists and engineers. In two or three years 400 employees are anticipated.

Ecsco's main office is located at 11607 South Paramount Blvd., Downey, Calif.

## Glass Plant Planned for N. C.

The **Laurens Glass Works** of Laurens, S. C. is constructing a glass container plant on a 72 acre tract in Henderson, North Carolina.

Glass bottles for soft drinks and glass containers for processed foods and household chemicals will be the principal products produced at the Henderson Plant. The plant will also operate a decorating department which applies a permanent multi-colored label to the glass containers.

Initially, this new industry will employ 150-175 persons. Within the next few years, the company expects to expand its markets and production in this area to the point that it will require about 500 employees.

# HAGAN NEWSLETTER

## Behind the Panel



### HOW AUTOMATIC ARE AUTOMATIC CONTROLS?

The answer depends a lot on the reliability factor in the system, and on how well the various control elements are integrated. A great many control systems are designed to operate on full automatic only when the process is within normal operating range. In applications where the process can vary widely, or where operators must be relieved of control supervision during abnormal conditions, true automatic control is desirable. Hagan systems are designed to accomplish this; for example:

OUTDOOR BOILER CONTROL SYSTEM STAYS ON AUTOMATIC DURING GENERATOR TRIP-OUT: a new outdoor utility station in the Southwest experienced a generator trip-out, and in the excitement, the 3-element feed-water control system was left on automatic. Inspection of charts after the difficulty was overcome showed that the feedwater system had maintained proper drum level throughout the two hour shut-down, even though the system went through the complete shut-down, start-up cycle.

SOAKING PITS NEVER OPERATED ON MANUAL CONTROL: on a new installation of two batteries of 3 pits, the heaters are instructed never to operate on manual control. In case of control malfunction, the pits are shut down until the system is repaired. In a year of operation, this policy has resulted in the loss of only four pit hours production time. Pit bottoms have not built up excessively, indicating close control of combustion and absence of ingot washing. (Item A-1)

### FIRST SOLID STATE ELECTRONIC BOILER CONTROL SYSTEM

Operational magnetic amplifiers, used as basic control elements in the combustion, feedwater, pump recirculation and steam temperature control systems, will be installed on a new 1,260,000 lb/hr boiler at a Southern utility. The Hagan proposal--for the first solid state electronic boiler control--was selected by the utility in competition with two other electronic systems that did not achieve the reliability inherent in a solid state system. (Item A-2)

### ELECTRONIC TEMPERATURE CONTROLLER SENSES 0.000001 VOLT CHANGE

Ultrasensitive, the Hagan PowrAmp Temperature Controller is responsive to thermocouple output fluctuations of one-millionth of a volt. Designed for precise temperature control in situations where either the heater or the product temperature can change rapidly, the Controller provides adjustments for proportional band, reset, and rate action. While this is a new instrument, it has already been proven in action. It was selected for the critical job of controlling glass fiber drawing dies operating at 1600F and it is limiting die temperature fluctuation to less than 0.25F. The Controller provides stepless regulation and will handle up to 330 kva through saturable reactors. (Item A-3)

### NEW POWRLOG OFFERS LOW-COST TEMPERATURE MEASUREMENT OR CONTROL

Our systems engineers wanted a rugged, low-cost remote recorder for process measurement in industrial applications. Once we decided that the right way to minimize maintenance was to make use of unitized construction, the acorn we had been asked for rapidly became a full fledged oak. We ended up with an instrument that will measure any function that can be converted into an error voltage, either AC or DC, and then convert these voltages into mechanical movement that may be used for driving a recorder, indicator, integrator, pneumatic transmitter or a controller.

Utilizing a unique amplifier that is adaptable to a wide variety of applications by means of plug-in input boxes, the new HAGAN PowrLog is particularly well suited for the remote measurement and/or control of temperature with either thermocouples or resistance bulb thermometers. The components of this versatile instrument have been selected for accuracy and high reliability--result--maintenance has been reduced to a new low. (Item A-4)

### HAGAN CHEMICALS & CONTROLS, INC.

Hagan Building, Room 700, Pittsburgh 30, Pa.

If you would like more information on any of the above items, check the appropriate box below.

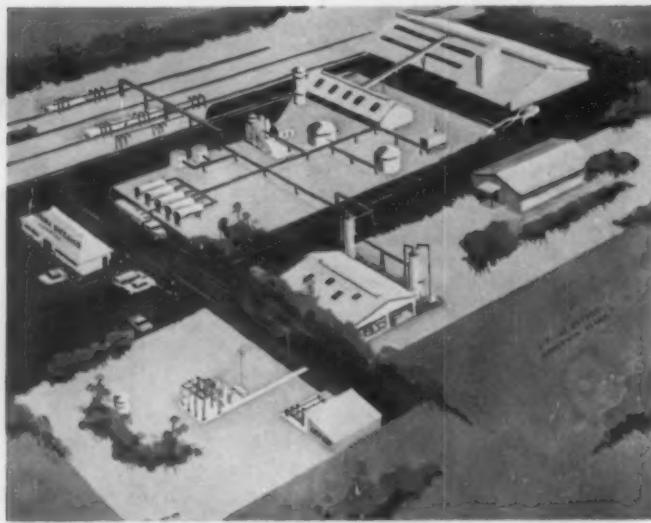
Item A-1

Item A-2

Item A-3

Item A-4

## *News of the South-Southwest — more power . . . more plants . . . more money*



### **MULTI-MILLION DOLLAR CHEMICAL INDUSTRY — FLA.**

**Florida Nitrogen Co.**, new and wholly-owned subsidiary of Southern Nitrogen Co. in Savannah, Ga., has announced plans to begin immediate construction of a multi-million dollar plant on a 25 acre tract in Tampa, Fla.

Supplied with ammonia from the Savannah plant, the facilities will produce solid 20.5% lime nitrate and a full line of nitrogen solutions for agriculture and industry.

In conjunction with the \$3,000,000 plant's construction will be the erection of a nitric acid plant. Later plans call for the construction of an ammonia plant. The 3-stage development is estimated to cost \$7,000,000.

Upon its completion, the plant will employ 100 persons and will use 5 million cu ft of natural gas, 250,000 gallons of water, and 108,000 kwh of electricity.

Resident officials of Florida Nitrogen are George V. Taylor, President; R. G. Riley, Vice President; Philip J. Fleming, Sales Manager; and N. F. Maddux, Plant Manager.

### **Continental Can Co. Bleach Board Mill Underway in Georgia**

**Continental Can Company** has begun construction of a 350-ton per day bleached sulphate paperboard and paper mill on the Savannah River near Augusta, Ga. The mill is expected to be in operation in early 1961.

Continental will consume the bulk of the new mill's output in its own manufacture of folding cartons,

plates, cups and other paper containers, and will offer the remainder for outside sale. The company does not currently produce its own bleached paperboard, although it converts bleached board purchased from outside sources.

The mill will be located on a 2,600-acre site, on the main line of the Georgia Central Railroad, 11 miles south of Augusta. Its pulpwood requirements will be supplied not only by its own timberlands in Georgia and South Carolina, but by nearby farmers and other woodland

owners from whom it will buy logs.

The initial 350-ton per day capacity of the new mill will be provided by a 216-inch trim Fourdrinier paper machine already on order from the Beloit Iron Works. The plant design, however, lends itself to step-by-step expansion.

Engineering design and purchase of equipment is in progress at Continental's Greenville, S. C., engineering office of the Robert Gair Paper Products Group. J. E. Sirrine & Company of Greenville is the engineering consultant.

Apart from the 400 employees at the mill itself, a large number of foresters, woodsmen and others will be employed in the management of its woodlands and other wood procurement operations which will supply the mill's average pulpwood requirements of about 700 cords a day.

A 25,000 kilowatt power plant, adequate to supply the electrical needs of a community of 75,000 persons, and a 25,000,000 gallon-per-day water treatment plant will serve the mill. All waste water from the mill will be treated in oxidation lagoons totaling 900 acres in expanse, to achieve major elimination of pollutants before the water is returned to the Savannah River.

### **Reynolds Aluminum Supply — Kentucky**

Another industrial metal center has been opened by **Reynolds Aluminum Supply Company** at Fern Valley Rd. and Crittenden Drive in Louisville, Kentucky. The all-aluminum sheathed Butler system structure provides over 50,000 sq ft of warehouse and office space.

Colorweld aluminum was used on the warehouse outer wall — material produced as a standard production run on the Reynolds Aluminum Supply Company's Atlanta roller coating lines and formed to the Butler configuration on Butler's regular equipment.

In addition to Louisville, Reynolds Aluminum Supply Company maintains nine other industrial metal centers throughout the South, along with a container manufacturing plant in Birmingham.



This complex header for the hot reheat line, here being finished at M. W. Kellogg's Jersey City shops, is an important part of the power piping for Alabama Power Company's Unit No. 3 at Barry, Alabama. This modern steam-electric plant addition in Mobile County is designed for operation at 2000 psi and 1000°F initial temperature; 1000°F reheat. The turbine will supply 225,000 KW.

All power piping for the unit is being fabricated and erected by Kellogg, who will also furnish and install all hangers, guides, anchors, supports, and similar equipment. K-Weld®, Kellogg's unique, inert gas-shielded arc welding technique, is being used on the main steam line and hot reheat lines, and was used in fabricating the header shown above.

Dimensions of the critical steam lines being fabricated of 1½ Cr., ½ Moly. in Kellogg's Jersey City shops are: *Main Steam*—17.5" O.D. x 2.25" minimum wall, and 12.75" O.D. x 1.6875" minimum wall; *Hot Reheat*—26" O.D. x 1.24" minimum wall, and 16" O.D. x 0.8025" minimum wall.

Kellogg welcomes the opportunity to discuss its complete power piping design, fabrication, and erection facilities with consulting engineers, engineers of power generating companies, and manufacturers of boilers, turbines, and allied equipment.

## KELLOGG'S

## PIPE SHOP

## FABRICATION

## KEEPS PACE



This new 8-page booklet, fully describing Kellogg's electronic computer method of making piping flexibility analysis, has just been published. Write for a copy.

### Fabricated Products Sales Division

**THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, N. Y.**

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**POWER PIPING—THE VITAL LINK**

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## *News of the South-Southwest — more power . . . more plants . . . more money*

### **\$58 Million by Georgia Power**

Georgia Power Company, now in the midst of one of the largest expansion programs in its history, will invest more than \$58 million in 1959 in new facilities.

The \$14 million Oliver Dam on the Chattahoochee River at Columbus and the new \$15 million generating unit at Plant McManus near Brunswick both will be completed this year. Work will continue on the Southern Electric Generating Company's 1,000,000 kw steam-electric generating plant near Wilsonville, Ala.

### **Two Pipe Plants for Florida**

Nearing completion is a 12,000 sq ft factory, costing \$225,000, for Florida Culvert Co. in Clearwater, Fla. The plant will manufacture coated culverts of corrugated steel in all sizes.

Another plant, costing \$150,000, is scheduled for construction as soon as the first is completed. The second plant will manufacture concrete pipe and culverts in all sizes.

The two plants are expected to employ 35 persons. E. H. Holcomb, Jr., president of Holcomb Pipe & Holcomb Construction Companies, is building the plants.

### **Hanchett Mfg. — Birmingham, Ala.**

The Hanchett Manufacturing Company of Big Rapids, Michigan and Portland, Oregon has announced the construction of a new branch office, factory and warehouse located at Fifth Avenue South and Thirty-First Street, Birmingham, Alabama.

Complete stocks of all Hanchett products will be maintained at the new branch and factory. To assist all purchasers of Hanchett Grinders in every possible way, the new branch office and plant will offer complete service facilities to owners of new Hanchett Grinders and Machines, throughout the entire southeastern section of the United States.



### **John Lee Promoted**

Prof. John F. Lee, a member of the North Carolina State College faculty since 1952, has been named head of the college's Department of Mechanical Engineering.

Announcement of Professor Lee's appointment to the position, one of the key jobs in the college's School of Engineering, was made jointly by Dr. Carey H. Bostian, State College chancellor, and Dr. J. Harold Lampe, dean of engineering.

The new department head succeeds Prof. Karl Hansen, who asked to be relieved of his administrative duties this past fall because of health reasons. He is now full professor of mechanical engineering.

Professor Lee, who was made Broughton Distinguished Professor of Mechanical Engineering in September, is recognized as one of the nation's top-level engineering educators. He has been widely acclaimed for his scientific achievements in the areas of jet propulsion, steam and gas turbines, and thermodynamics.

Last year he was awarded a two-year National Science Foundation grant for scientific research. Since joining the faculty at State College, Professor Lee has been responsible for a number of research projects.

Besides serving as graduate administrator for the Mechanical Engineering Department, he is a member of many committees, both college and professional. He is recognized internationally for his textbooks and his more than 75 published technical papers. In addition, he is con-

sulting editor of mechanical engineering textbooks of Addison-Wesley Publishing Company.

Professor Lee is consultant on atomic power for "Southern Power and Industry." He is also the editor of "Nuclear Engineering," and writes a monthly series for "Consulting Engineer."

### **\$2.8 Million Plant Underway for TI**

Texas Instruments Incorporated has begun construction on a 192,000 sq ft addition to the present 310,000 sq ft Semiconductor-Components division plant, already the world's largest facility for manufacturing transistors and related devices.

The addition will be made to the south end of the existing plant which was the first building erected on TI's 300-acre site on North Central Expressway in northeast Dallas. It will represent an additional investment of approximately \$2,800,000, exclusive of the land, to the \$6,000,000 cost of the new S-C plant which was dedicated last June.

With completion of the addition in approximately 12 months, TI will have more than 500,000 sq ft of manufacturing, development and administration space devoted to the design and production of semiconductor devices.

Contract for construction of the addition has been awarded to Robert E. McKee General Contractor, Inc., of Dallas. Architects are O'Neil Ford and Richard Colley.

The Semiconductor-Components division manufactures a full line of silicon and germanium transistors, silicon diodes and rectifiers, solid tantalum capacitors, precision resistors, infrared detection cells, and ultra-pure silicon material.

### **J. M. Tull Opens S. C. Warehouse**

Ferrous and non-ferrous metals, fasteners, fittings and other metal accessories of all alloys are now being stocked in The J. M. Tull Metal & Supply Co.'s new warehouse at 205 Airport Rd., Greenville, S. C. James H. Joyner is Manager.

## Now's the time to prevent freezing of heater coils... with Production Planned steam trapping

By John W. Ritter, Test Engineer,  
SARCO Company, Inc.

Freezing of heating coils usually takes place when outside air temperature is slightly below the freezing point, and it is most common in coils that have the steam supply controlled by a temperature regulator which keeps the outlet air temperature constant. Freezing can occur only when the coil becomes water-logged, and in this case the steam trap is often blamed for the trouble.

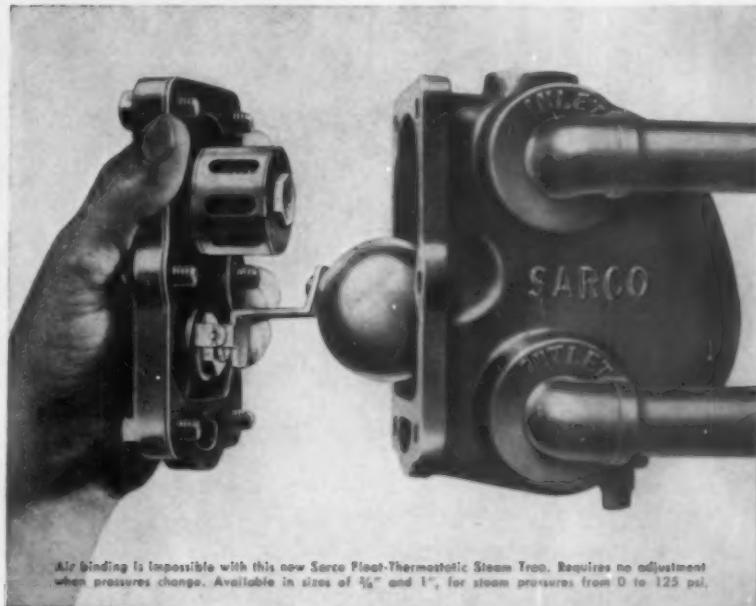
The discharge capacity of any steam trap depends upon the difference in pressure between the trap inlet and its outlet. If there is no pressure difference, the trap cannot remove condensate; and if inlet pressure is lower than outlet pressure, condensate will be held back in the coil.

There are three ways to avoid this difficulty. First, a pressure controlled bypass can be arranged around the temperature control valve to prevent heater pressure from falling below a preset minimum. This plan would make the temperature controller ineffective over part of the range of outside air temperature.

A better solution is to install the steam trap well below the unit, and thus provide a hydraulic leg to enable the trap to discharge even with a vacuum in the steam space. An ample sized vacuum breaker should be installed at the top of the steam inlet of the heater.

To compute the hydraulic head needed, use a figure of 3' per 1 psi pressure differential. For example, if the trap has the required capacity at 1 psi differential, the minimum head will be 3'.

Thirdly, on new construction, the pre-heater can be divided into two sections. The first should be capable of raising the air to at least 32° under minimum outside air conditions. The second section should raise the air from 32° to the final temperature. Full steam is supplied to the first coil at all times, while the second is controlled to maintain the final temperature needed. The first coil will not freeze because of the maintained pressure, nor will the second, because minimum air temperature is always above 32°.



### A SARCO F-T Steam Trap will drain condensate completely

Count on the Sarco Float-Thermostatic Steam Trap to discharge condensate practically at steam temperature, continuously and without shock. Sarco F-T's do not cause pressure fluctuation while discharging.

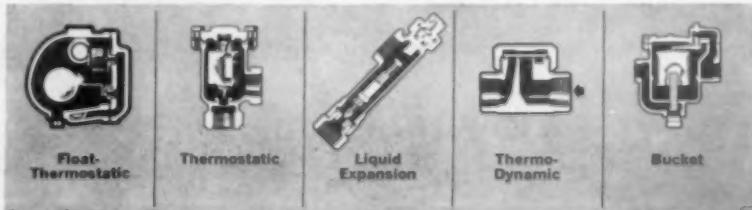
For *production planned* trapping of heating coils, with accurate temperature control, use the new Sarco

Steam Trap Type F-T.

Write for Technical Bulletin T502 on prevention of freezing in heater coils. You'll also receive a bulletin on Sarco F-T Steam Traps.

Remember that Sarco can give you *impartial* advice on steam trapping because only Sarco makes all 5 types.

5968-B



Only Sarco makes all 5 types:

Thermostatic • Liquid Expansion • Float Thermostatic  
Thermo-Dynamic • Bucket

**SARCO**  
COMPANY, INC.  
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STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES



**formation of Scale  
and Corrosion  
in boilers  
WITH**



# **BRAXON**

**internal  
feedwater treatment**

BRAXON is a specially formulated feedwater treatment that conditions water so as to remove and prevent scale formation and corrosion in boilers. BRAXON bases its effectiveness on phosphate and carbonate control . . . maintaining the proper alkalinity and softness in the feedwater. Special BRAXON formulas inhibit the tendency of some feedwaters to produce foam-

ing and carryover. No single formula can be applied successfully to all the various types of boiler feedwater. BRAXON formulas are prepared specifically for use in *YOUR* plant after a careful analysis and study of raw water used. Your BRAXON formula will keep your boiler operating at top efficiency, eliminating shut-downs and repairs caused by corrosion and scale.

*Write today and request an Anderson service engineer to make an analysis and recommendations on your plant's water treatment. There's no cost for this service.*

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## **News of the South-Southwest — more power . . . more plants . . . more money**



**Rayburn, Johnson, Martin & Smith**

### **NBP Honors Congressional Leaders**

National Business Publications, of which Southern Power & Industry is a member, annually presents a "Silver Quill Award" to an outstanding leader in business or government who has rendered distinguished service to business and to the nation. This year's award was jointly presented to Speaker Sam Rayburn and former Speaker Joe Martin, Jr. in ceremonies at Washington, D. C., January 23. NBP's Chairman of the Board, Richard P. Smith, president of W. R. C. Smith Publishing Company, presided at the meeting and the presentation speech was made by Senate majority leader Lyndon B. Johnson. Approximately 1,500 business leaders and top government officials were present.

### **Connors Steel — Birmingham, Ala.**

**Connors Steel Division, H. K. Porter Company, Inc.**, is beginning construction of new steel making facilities at its Connors Works in Birmingham, Ala.

The modernization will cost approximately a half-million dollars and increase the annual ingot tons output by approximately 25%. The expansion includes construction of a pouring building, adjacent to the furnace department, with a 25 ton crane and the installation of pouring car equipment. These new facilities will allow operation of all three of Connors electric furnaces simultaneously instead of the former procedure of two melting and the third as a spare. Target date for completion of the project is early May. It is expected additional personnel will be needed to handle the increase in tonnage.

This is the second mill expansion

in three years. The \$2,500,000 modernization completed in late 1956 netted the Connors Works an increase in annual ingot tons of approximately 24%.

### **PLANT PERSONNEL**

#### **Engineering-Management Promotions Announced by Major Southern Plants**

**Elmer J. Mueller**, recently transferred from St. Louis, is now Factory Superintendent of Medart Lockers, Inc., Greenwood, Mississippi.

**Joseph Williams Chalmers**, previously overseer of weaving at the Amerotron Co. plant in Red Springs, N. C., has accepted a position as assistant to the general superintendent of Borden Mills, Inc., Kingsport, Tenn.

**Joseph P. Hughes** has been named manager of the Eno plant of Cone Mills Corp. at Hillsboro, N. C. replacing Sydney Green who has retired.

Promoted to the position of plant manager of Orr Mills, Anderson, S. C. is **Leroy S. Gaffney**. He will retain his duties as technical manufacturing consultant to the executive vice president in charge of manufacturing.

Fulton Cotton Mills, Atlanta, Ga., has announced the promotions of **Warren W. Danner** to general superintendent and **J. A. Bradshaw** to maintenance superintendent of grey mills. **Luther Wallace** has been named to the newly-created position of superintendent of towel manufacturing.

**John H. Schuler** has been named vice president and general manager at Anderson Electric Corp., Birmingham, Ala., replacing Thomas H. Fox, who will continue as company president. Mr. Schuler will continue as secretary and member of the board of directors.

Moloney Electric Co. has announced the promotions of **J. M. Dohr** to Vice President in Charge of Production and **G. T. Wooten** to the newly created position of Plant Manager. Mr. Dohr replaces C. G. Duenke, who has gone into business for himself.

**Crawford Anderson** has been appointed power engineer for St. Regis Paper Co. in Pensacola, Fla.

**Walter J. Willis** has become the personnel director of the Southern factory of Pratt, Read & Co., Inc., Central, S. C. **David C. Semonite** is plant engineer.

**George D. Brengelman**, formerly general superintendent of the Ensley steel works of United States Steel's Tennessee Coal & Iron Division, has been promoted to the general superintendence of the Fairfield Steel Works. Succeeding Mr. Brengelman is **Harlan W. Bullard**, formerly assistant general superintendent at the Fairfield plant. **Eugene K. Graham**, previously assistant to the general superintendent at the Fairfield steel plant, advances to the position of assistant general superintendent.

## *News of the South-Southwest — more power . . . more plants . . . more money*

### **FUTURE EVENTS of Engineering Interest**

**Mar. 1-3: Southern Safety Conference & Exposition.** Battery Park and George Vanderbilt Hotels, Asheville, N. C. W. L. Groth, Exec. Dir., Southern Safety Conference, Box 8927, Richmond 25, Va.

**Mar. 2-3: Heat Transfer Symposium.** Engineering & Industries Bldg., Room 512, Engineering & Industrial Experiment Station, College of Engineering, University of Florida, Gainesville, Fla. Eric A. Farber, Symposium Supv., Mechanical Engineering Dept., U. of Fla., Gainesville, Fla.

**Mar. 8-11: Gas Turbine Meeting.** American Society of Mechanical Engineers, Cincinnati, Ohio. L. S. Denegar, Dir. of Pub. Rel., ASME, 29 West 39th St., New York 18, N. Y.

**Mar. 9-10: Annual Convention, International Acetylene Assoc.** Hotel Roosevelt, New Orleans, La. IAA, 30 East 42nd St., New York 17.

**Mar. 16-17: Spring Conference.** Lubrication Division, American Society of Mechanical Engineers, Franklin Institute, Philadelphia, Pa. ASME, 29 West 39th St., New York, N. Y.

**Mar. 18-20: 22nd Annual Short Course for Superintendents & Operators of Water & Sewerage Systems.** Louisiana State University, Baton Rouge, La. F. H. Fenn, Dean, College of Engrg. and Dir., Engrg. Experiment Sta., La. State Univ., Baton Rouge 3, La.

**Mar. 23-25: Annual Conference, Southeastern Electric Exchange.** Boca Raton Hotel and Club, Boca Raton, Fla.

**Mar. 31-Apr. 2: 21st American Power Conference.** Hotel Sherman, Chicago, Ill. R. A. Budenholzer, Mech. Engrg. Dept., Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill.

**Apr. 2-3: Annual Conference on Electrical Application in the Textile Industry.** American Institute of Electrical Engineers; Heart of Atlanta Motel, Atlanta, Ga. J. W. Ward, EE, Avondale Mills, Sylacauga, Ala.

**May 4-6: Southern Metals Conference.** Bon Air Hotel, Augusta, Ga. SMC Committee, 567 Banks Mill Rd., S.E., Aiken, S. C.

**May 11-13: Second Annual Power Conference.** President Hotel, Kansas City, Mo. Charles S. Koegel, Pub. Chairman, Kansas City Section of the Instrument Society of America, 8900 Westbrook Dr., Overland Park, Kansas.

**May 14-23: 14th International Petroleum Exposition.** Tulsa, Okla.

**June 1-5: 5th World Petroleum Conference Exposition.** Coliseum, New York, N. Y. E. K. Stevens, Exposition Mgr., International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

**June 9-12: Material Handling Institute's Exposition.** Public Auditorium, Cleveland, Ohio. W. L. Redding, Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa.

**June 21-26: Annual Meeting, Air Pollution Control Association.** Statler Hotel, Los Angeles, Calif. Harry M. Pier, Exec. Secty., APCA, 4400 Fifth Ave., Pittsburgh 13, Pa.

### **Memphis Steel Service Center**

United States Steel Corporation's **U. S. Steel Supply Division** is constructing a new 40,000 sq ft Memphis warehouse at Harbor Avenue and Dock St. on President's Island, Memphis, Tenn.

New facility will offer a complete line of steel and steel strapping materials and equipment to customers in central and southwestern Tennessee, Arkansas, Mississippi and northern Louisiana.

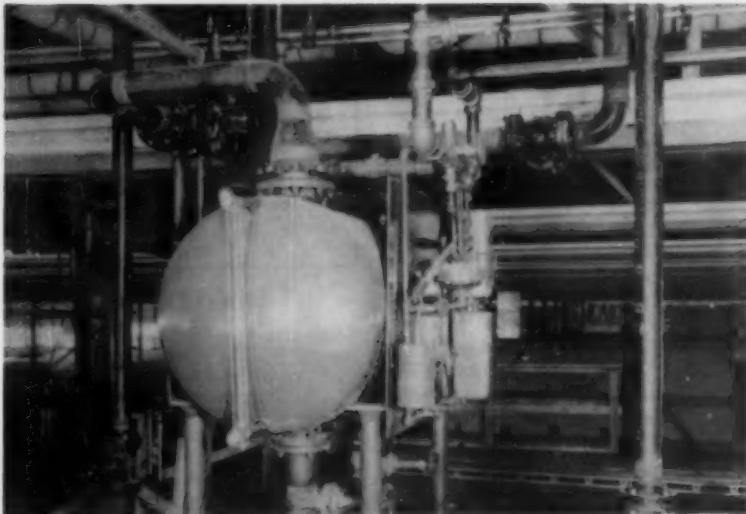
(Continued on Page 69)



**Chattanooga, Tenn.** — More than 70 production foremen and safety specialists from the Chattanooga area attended a one-day "Safety in Lifting School" which was held recently at the Combustion Engineering, Inc., plant at Chattanooga, Tenn. The School is sponsored by the Wire Rope Division of Jones & Laughlin Steel Corporation and is aimed at teaching the correct use of slings in material handling and in reviewing allied safety principles. The school is on a nationwide tour of industrial plants. Shown above, left to right are: **Don Beckler**, general foreman, Combustion Engineering, Inc., **Marshall Olds**, sales-service engineer for the J & L Wire Rope Division, and **Pat McHugh**, Combustion Engineering safety engineer.

# BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



One of two batteries of condensate pumps installed in each of five similar buildings at General Electric Appliance Park, Louisville, Ky. To protect against damage from steam condensate corrosion, Wrought Iron Pipe has been installed for the return lines within each building and to the area's central boiler plant.

## Seven Ways to Minimize Maintenance In Steam Condensate Systems

While selection of the right piping material precludes virtually all other factors in controlling condensate corrosion, additional service life can be squeezed from your existing system by following these helpful suggestions:

1. The feed water deaerator should be operated at or near boiling point, and should be maintained in an efficient condition.
2. All joints in return lines operating under sub-atmospheric pressures should be made airtight.
3. All horizontal return lines should be given sufficient slope or pitch to permit rapid and complete drainage.
4. All low points or pockets in the lines where condensate can collect should be eliminated or properly tapped.
5. Reaming of pipe ends to remove burrs is particularly important in condensate lines.
6. Cold water injection into return lines ahead of vacuum pumps

should be avoided wherever possible.

7. Extra heavy nipples should be used in return lines.

Practically any application where steam condensate is conveyed through pipe is a "natural" 4-D Wrought Iron application. Here are two reasons why:

1. Ordinary metals corrode quickly and become costly maintenance headaches. Alloy steels increase initial costs greatly.
2. 4-D Wrought Iron's corrosion-blocking film forms around the interior wall of the condensate line enabling the pipe to give long, maintenance-free service.

Incidentally, since the right piping material means so much to service life in steam condensate systems, you may wish to contact our Engineering Service Department staff. They maintain records and data spanning 60 to 75 years which show how long various materials endure in steam condensate service.

## How D. L. Clark Co. Cuts Maintenance Costs 50%

"Because of the excellent service life of 4-D Wrought Iron Pipe in the plant, fewer pipe fitters and helpers are needed," says the mechanical superintendent at the D. L. Clark Company, Pittsburgh, Pa.

Here, at the home of the famous Clark candy bar, 4-D Wrought Iron Pipe, one-half inch to six-inch sizes, and 4-D Wrought Iron nipples are kept in stock. This pipe material is used for steam lines, condensate return lines, air lines, hot and cold water lines, and chocolate lines.

Mr. Robert Dunbar, the plant's mechanical superintendent, credits 4-D Wrought Iron with cutting maintenance costs approximately 50 per cent in his operation.

4-D Wrought Iron proves especially effective at the Clark Company against that old bugaboo, condensate corrosion. Let's review the nature of this nemesis for a minute. After steam loses its heat, it turns to moisture, which is distilled water greedy for gases. Any gas in the steam is readily absorbed into the condensate as it is cooled. The condensate becomes violently corrosive, depending upon the percentage of free  $\text{CO}_2$  plus  $\text{O}_2$  contained in the steam. Becomes downright costly, too, if allowed to rampage. 4-D Wrought Iron doesn't let it.

## A Forging Tip or Two

In order to forge 4-D Wrought Iron successfully, it is necessary to heat it to at least 2300°F., and stop working it when it reaches a temperature of 1750° to 1800°F. At 2300°F., 4-D Wrought Iron gives a greasy heat. From 2500° to 2600°F., it will sweat.

Higher temperatures are essential in forging 4-D Wrought Iron because of its low carbon content. 4-D Wrought Iron with its low carbon content will take much more heat without burning than other materials with higher carbon. At the right temperatures, 4-D Wrought Iron is a cinch to work and form.

# BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company

page 2



## How to Dry Sand With No Piping Downtime

Norton Company, Worcester, Mass., has a tough assignment for heat exchanger tubes: in a sand drier that removes moisture from the abrasive materials used in grinding wheels, refractories, laboratory ware, non-slip tile, and other products. The tubes, which carry steam or hot water, are housed in a rotating shell filled with the sand.

Tubes in this service are subject to the punishing corrosive action of the moisture in the sand as well as the abrasion of the sand as it rushes over the coils. The inside walls of the tubes are also subject to corrosive action because of the condensate they carry.

Water or moisture in the sand usually has a chloride content. And 4-D Wrought Iron's proven resistance to salt and brine effects provides an excellent basis for comparison in this service.

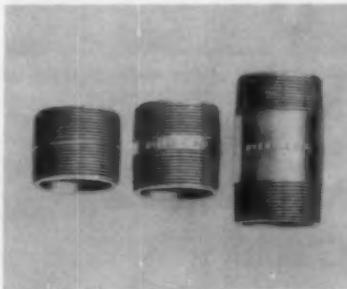
If corrosion or abrasion is playing hob with your piping coils, it could be you're using an inadequate piping material. Maybe it's time you investigated the advantages of 4-D Wrought Iron.

## Right Pipe, Wrong Nipples, Premature Failure

In a steam condensate line installation in North Carolina, specifications called for wrought iron pipe to be used. Steel nipples, however, were selected for this corrosive service.

Within three years, the steel nipples began to fail. They were replaced with wrought iron nipples, and the steam condensate line has experienced no trouble since. Therein lies an object lesson.

4-D Wrought Iron nipples, preferably extra strong, should always be used in any piping system because the majority of failures occur at joints which should really have extra protection.



Identification is important, too. Here's how to be sure you get what you order. Byers 4-D Wrought Iron nipples, other than close nipples, are machine stamped with the word BYERS and STD for standard weight, or X STG for extra strong pipe. Close nipples bear a red band around the center. Couplings up to and including 14" are stamped with a "B" within a keystone. If you want durability—all the way down the line—insist on 4-D Wrought Iron nipples.

## WHAT IS "4-D"?

Note: New 4-D Wrought Iron was achieved by substantially increasing the deoxidation of the base metal, slightly increasing the phosphorous content, and using a more siliceous iron silicate. Result is increased corrosion resistance, improved mechanical and physical properties.

## Literature Available

Literature described below is available on request. For information on specific applications, write Byers Engineering Service Department.

New four-color booklet, **4-D Wrought Iron: A New Dimension in Corrosion Control**, discusses in detail Byers' latest product development. Includes a test section which is graphically illustrated and shows comparative corrosion resistance of 4-D Wrought Iron, standard wrought iron and other ferrous metals.

Information on facts affecting corrosion, comparative service records, and suggestions for minimizing maintenance are presented in our special report: **The Use of Wrought Iron in Steam Condensate Lines**.

Complete mechanical data on all Byers pipe and tubular products are available in the **Byers Pipe Catalog**. Discusses differences between 4-D Wrought Iron and steel. Includes specifications, pipe standards and measurements.

New ten-page bulletin, **Cold Drawn Wrought Iron Heat Exchanger and Condenser Tubes**, cites actual installations in which the use of 4-D Wrought Iron and other metal tubing in the same equipment permits service life comparisons. Lists cost-per-foot-per-year figures for each material and the corrosive conditions present.

For additional information on 4-D Wrought Iron, contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE were prepared by the Engineering Service Department of

## A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

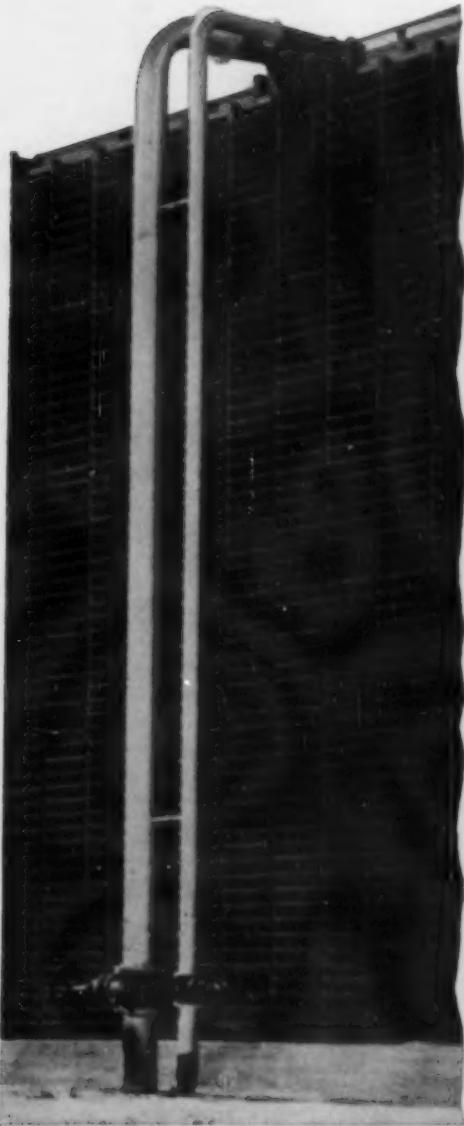
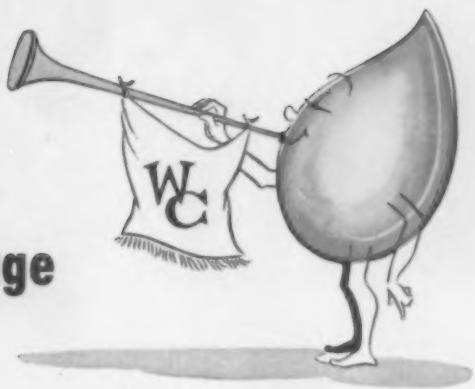


ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA  
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron

# An important message to men with algae problems



## Get safe, quick control with Allis-Chalmers No. 120 Series Algaecide

This low-cost way to kill algae was introduced by Allis-Chalmers two years ago. It has proved an ideal solution to problems of plugged pump strainers, coated heat exchanger tubes and coated slats in cooling towers.

### Many Advantages

- **Safe** — Even in concentrated form it is only a mild irritant to skin and eyes.
- **Easy handling** — Pump, drip feed or manual feed can be used. No expensive feeders needed.
- **Non-oxidizing**
- **Corrosion inhibiting**
- **Service proved**
- **Economical** — Only 2 to 5 ppm required for effective dosage of most organisms.
- **Long lasting** — No loss of algaecide on passage through cooling tower.
- **Low toxicity** to fish or animals.

Number 120 Series Algaecide is toxic to more algae than any other algaecide. For complete information, call your nearby A-C office, or contact Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for Bulletin 28X8434.



## ALLIS-CHALMERS

# "CHARTS"

By SOUTHERN POWER & INDUSTRY gives quick solutions for everyday problems.

This 74-page, 7x10" Manual Serves the Needs of Plant Engineering-Operating and Maintenance Personnel.

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Products manufactured or nature of business \_\_\_\_\_

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Elbows with special included angles, special tangents, special wall thicknesses and of special materials are easily and promptly made. Closer tolerances are inherent in the Midwest process. Quality control always exceeds code requirements . . . can be as comprehensive as you need.

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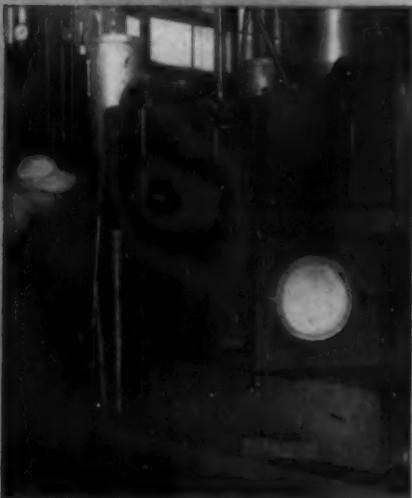
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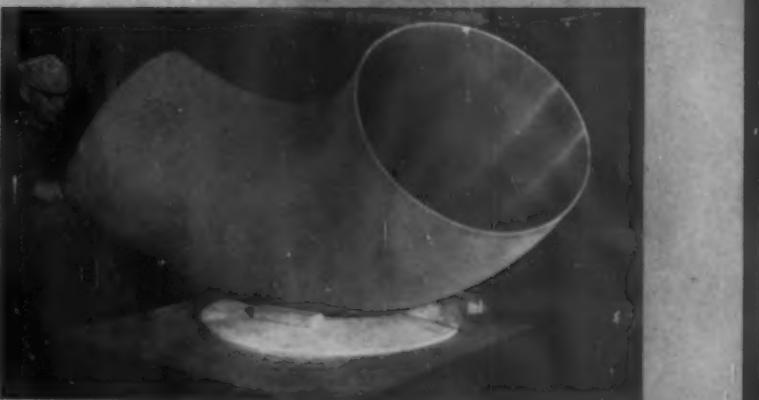
16" O.D. x 1 1/4" wall 90° elbows (2 1/2% chrome 1 1/2% moly) being sized in compression by totally enclosing dies. The exceptional dimensional accuracy that results is possible only with the Midwest process.



Entire interior and exterior surfaces of special stainless elbows for nuclear power plant are inspected with dye penetrant in search of microscopic surface imperfections. Elbows are 16" O.D. with 102° included angle and long tangent on one end.



Note the exceptionally long tangent on one end of this 36" O.D. 90° short radius elbow made of special carbon steel. Similar tangent could have been provided on other end if required.

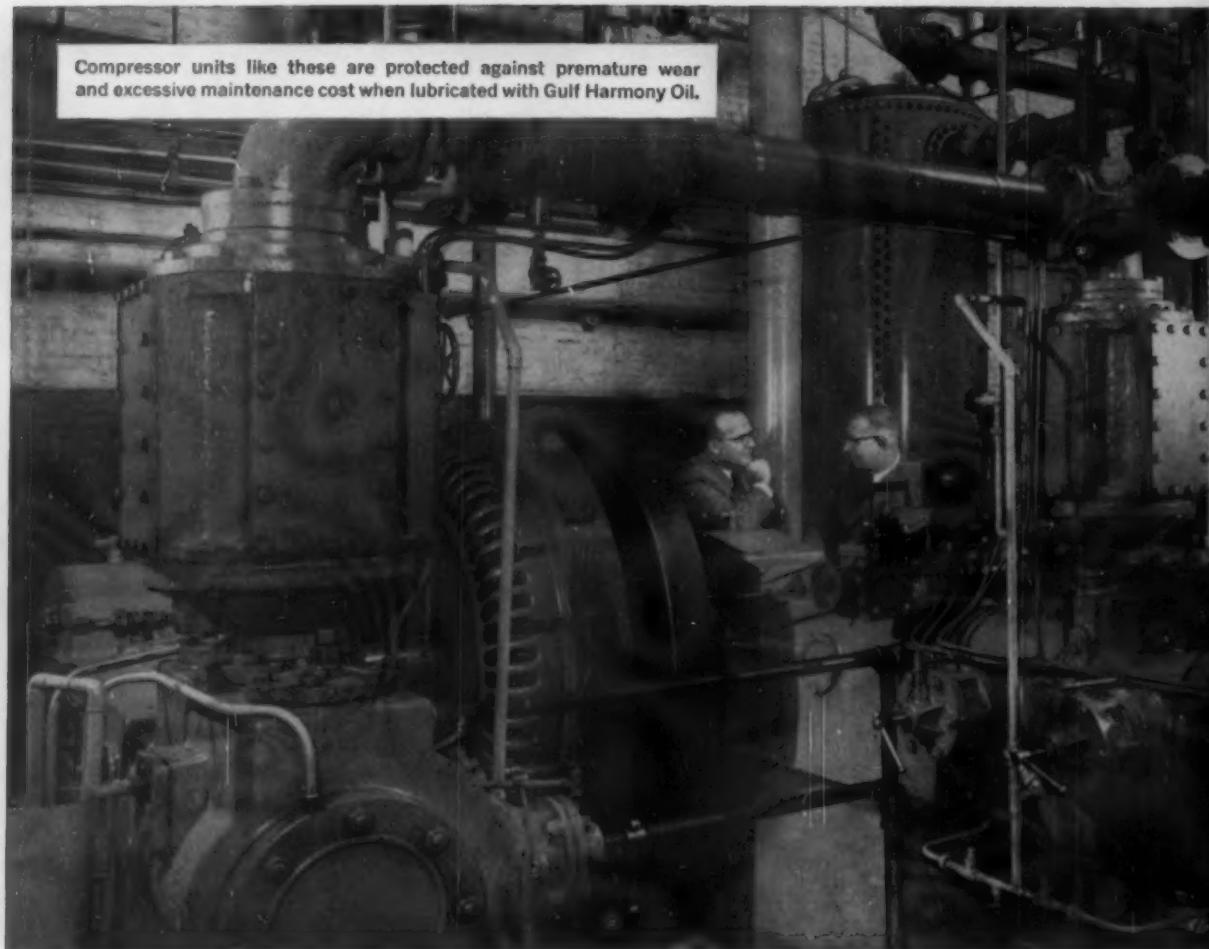


Interior surface of 30" O.D. stainless steel welding elbow for liquid sodium nuclear system required a finish of 125 micro-inches or better.

# MIDWEST

# WELDING FITTINGS

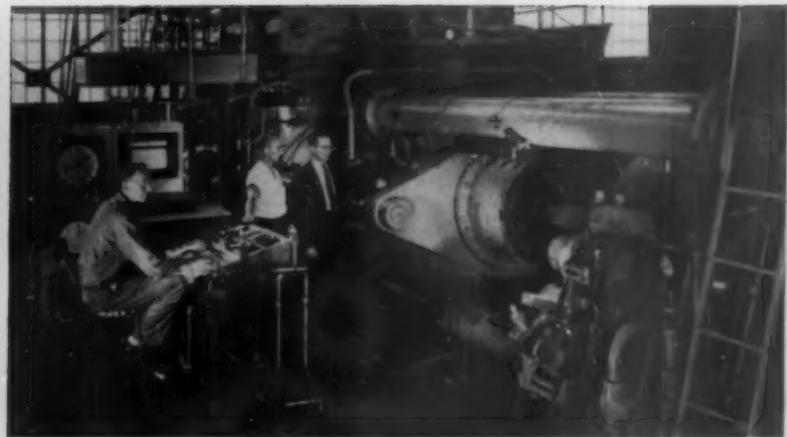
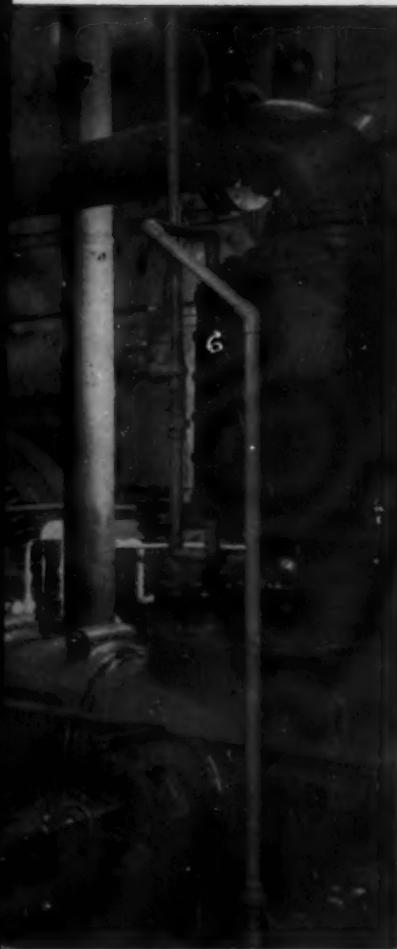
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**Gulf makes things run better with outstanding multi-purpose  
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Gulf Harmony, a long-time favorite multi-purpose oil, is now further improved to serve you even better. Here are a few of the improved Harmony's many advantages:

- Higher oxidation resistance assures longer life and freedom from harmful sludge deposits.
- Retains its original viscosity over longer periods of time.
- Maintains its color stability longer.
- Anti-corrosion additive protects against rust.
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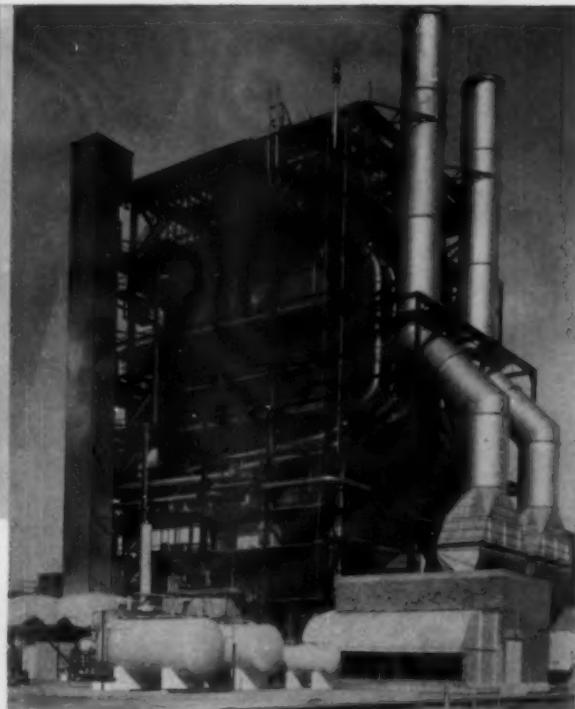
City  Zone  State



SPH-0117



STERLINGTON station of Louisiana Power and Light Co., near Monroe, Louisiana. The view above shows ceramic tile in the machine shop. Outdoor boiler installation at right makes extensive use of porcelain enamel.



### **Better Appearance and Better Maintenance**

## **Ceramic Tile and Porcelain Enamel**

**THE STERLINGTON** station of Louisiana Power & Light Co. is one of the most completely automated generating power stations in the country. (SPI, Aug., 1958)

"The computer transmits information to the logging machines which are monitored by the control board operator a few feet away. And we have already achieved refinements that will be applied in future plants," said W. T. Hess, the company's Vice President and Chief Engineer.

But important as are the operating features, equal attention was given to materials for building construction.

#### **Ceramic Tile**

The view at left above shows ceramic tile in the machine shop. Walls in the control center and plant offices are also of tile. Floors of the control center and offices

are covered with acrilan carpeting, an unusual feature for a steam plant.

Company officials believe that good quality of construction in the service areas generally costs no more. In the long run it probably won't cost as much because maintenance is expected to be less.

The station's designers used ceramic tile on the walls for two reasons: A wide selection of colors was available and the easily cleaned surface will never require painting.

Ease of maintenance and comparatively low initial cost also led to the use of carpeting on the floors. It also has a good acoustical value and contributes to comfort and efficiency of personnel.

#### **Porcelain Enamel**

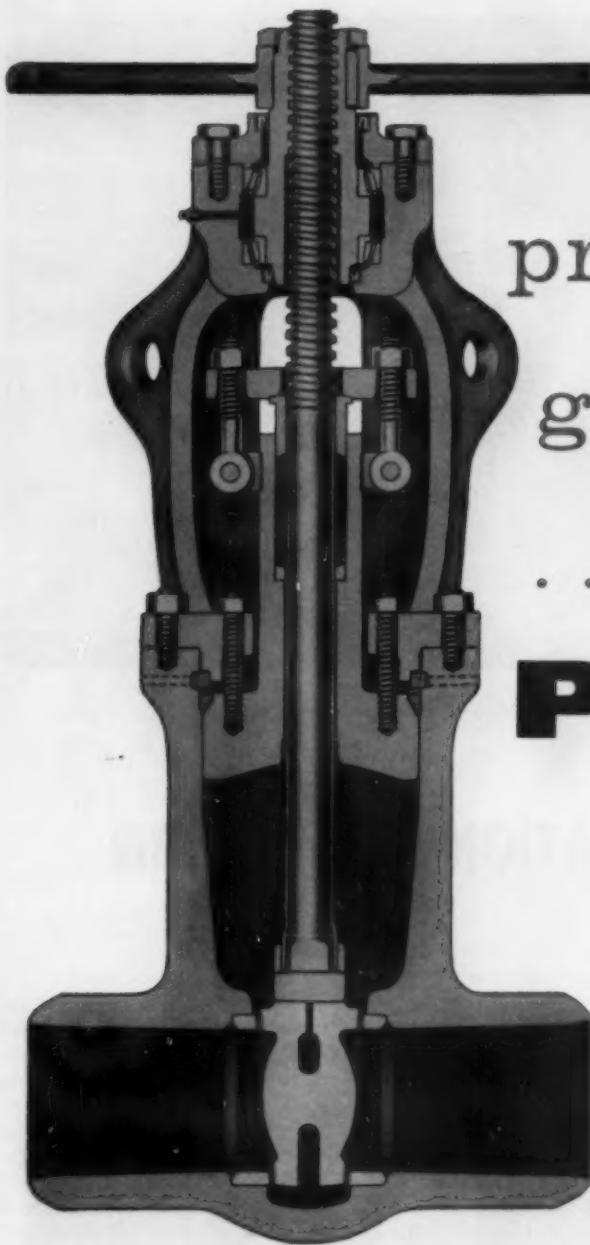
Porcelain enamel was employed to protect the boiler. The cover is designed to shed water and the

sides are encased with the same material.

In addition, porcelain was employed on the curvatures of the heaters and stack uptakes. Ample provisions was made for expansion and contraction. (4½" in the height of the boiler.)

All of the porcelain enamel material for this job was prefabricated and porcelainized in the Avon-craft Plant of Avondale Marine Works Inc. in New Orleans, thus eliminating fitting in the field which would produce raw edges subject to rusting. Also, to the fullest extent possible, holes for fastenings were provided in the shop.

In much the same manner as a turtle shell, architectural porcelain enamel has a great potential as a means of providing a rust-proof and colorful protective sheathing for many types of industrial facilities.



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Greenville, S. C. — Year-round comfort for factory workers at Barbecue King Sales, Inc. plant.

## REFLECTIVE INSULATION Cuts Heat Bill

**ALUMINUM** reflective insulation suspended from the ceiling of a Greenville, S. C., plant has cut heating costs by more than 60% and has eliminated the need for air conditioning, according to R. G. Wilson, president of the manufacturing firm.

The lightweight aluminum foil reflects 95% of all heat reaching it by radiation. Its polished finish requires no maintenance and it is extremely inexpensive to install.

Alfol, manufactured by the Reflective Corporation, consists of multiple layers of aluminum foil which automatically space themselves about one inch apart when installed. The captive air spaces between the foil layers add to the insulating efficiency.

The bottom aluminum layer is laminated to a heavy, waterproof duplex backing that provides application support to eliminate ripping and sagging. This makes the material self-supporting, with no

need for reinforcement of any type.

Since the ceiling in this plant is supported by steel beams, the insulation company drilled holes through the top flanges of the beams and sandwiched two wood furring strips in between the ceiling and the top of the beams. Nuts and bolts were used to secure the strips tightly to the top of the beams. 500 ft rolls of 16-in. width Alfol blankets were used in the installation. These were "dished in" or recessed between the furring strips attached to the beams.

Since the ceiling beams are spaced about 10 ft apart throughout the building, the Alfol blankets between the beams were simply stapled together. They were placed next to each other in regular "dish-in" position. Using a plier-type stapler, the flanges of the Alfol blankets were stapled to adjacent preceding lengths. The strong duplex backing is more than adequate to support the nearly

weightless aluminum sheets.

Within four days, the Thermal Insulation Company had installed 15,000 sq ft of Alfol (the entire ceiling) and without disrupting production operations.

The most immediate results of this insulation job were in the form of improved lighting. Workmen conservatively estimate that the highly polished reflective aluminum ceiling was responsible for a 35% improvement in plant illumination. This permanent natural finish also eliminates the need for paint maintenance.

Winter insulation against the cold has been improved by 53%, while summer insulation against the heat has been increased by 35%. At the same time the positive vapor barrier combination of the aluminum and kraft paper backing has completely eliminated condensation between the ceiling and roof of the building. Year-round comfort is provided.

# Reliance Boiler Safety for 75 Years

There has always been danger from low water in boilers — even at 50 lbs. pressure! Accidents — *boiler explosions* — did happen back in the days when pressures over 50 psi were considered "high".

So the Alarm Water Column was invented by a man who recognized the need, and in 1884 Reliance introduced the forerunner of water columns used today in thousands of power plants.

Reliance has kept abreast of the steady rise in working steam pressures with appropriate designs in water columns, with and without alarms. Necessary items for column "trim" — try cocks, gage valves and gage inserts, (also direct-to-drum assemblies) gage illumination,

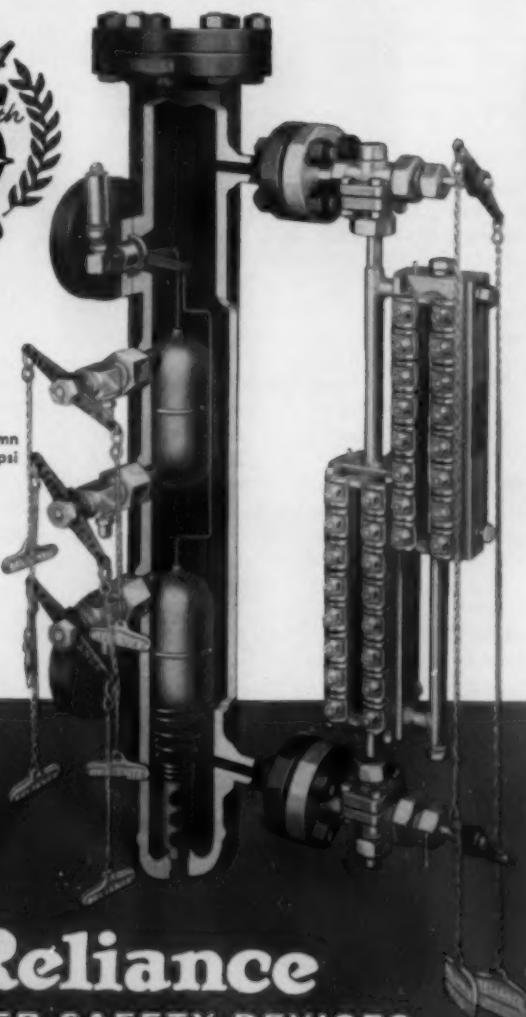
and auxiliary alarms and indicators are offered in various types to suit all needs.

Reliance produced the first compensated remote reading boiler gage in America. The EYE-HYE now serves as an extra safety factor for many thousands of boilers, both stationary and marine. More recently, Reliance electrode-type devices have made it possible to actuate alarms, fuel cutouts, and start and stop pumps on any pressure.

The *originator* of safety water columns, Reliance has been the only manufacturer devoted exclusively to the measurement of boiler water levels for the past 75 years . . . Reliance engineer representatives are located in all principal cities.



Typical Water Column  
for pressures to 900 psi

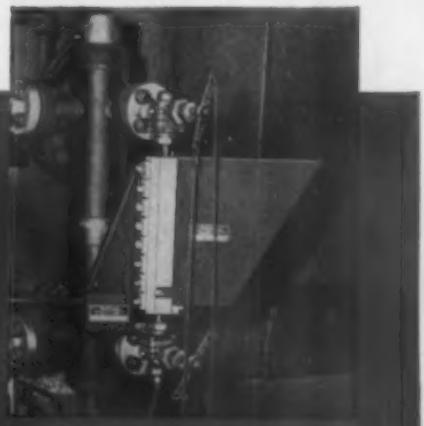


**Reliance**  
BOILER SAFETY DEVICES

The Reliance Gauge Column Company, Cleveland 2, Ohio



Above — newly styled EYE-HYE remote gage  
readable up to 90° either side of center.



## When Is Equipment Obsolete

### Question

WE ARE MANUFACTURERS of metal products which involve stamping, shaping, assembling, and so on. During the past three years our profits have been on a down grade and we are naturally much concerned. On several occasions salesmen have told us, after going through the plant, that some of our machinery is obsolete and should be replaced.

Is there any way by which we can tell with reasonable certainty, just when a machine is so obsolete that it should be replaced by a newer model?

### Suggestion

WHEN THE ANNUAL operating costs of an existing machine are greater than the annual operating costs of a new model, the existing machine theoretically is obsolete.

Calculating annual operating cost is not always easy and requires judgment on certain items. To illustrate, assume the existing machine cost \$4,800 fifteen years ago; its estimated life at purchase was 30 years; it occupies 30 square feet of floor space; it consumes \$1,000 worth of power a year, and its average annual maintenance has been \$100 a year.

Today, the new model sells for \$10,500; it occupies 16 square feet of floor space; its power bill is \$780 a year, and its average predicted maintenance is \$125.00 a year. Its production adds up to 1-1/3 times that of the existing machine. The table shows a comparison of costs.

Since the new machine delivers 1/3 more production than the old, putting the new machine on an equivalent basis means dividing \$1,651.17 by 133% = \$1,241.47.

On the basis of this equivalent production, the new unit would save about \$243 a year in operating costs. However if your sales remain off as at present, buying production capacity you can't use isn't good business either.

This situation looks entirely different if you are operating a number of these machines and can sell the product produced. Three new units would equal the production of four old ones, consequently the annual saving would become  $(\$1,484.67 \times 4) - (\$1,651.17 \times 3)$  plus a possible \$3,000 in the wages of one operator eliminated, a total of \$3,985.17.

For an investment of \$31,500 for three new machines, you would have a pay-off in about 8 years, which is good business.

As we see it, some labor saving will be necessary to justify your buying new equipment at the prices stated.

### COMPARISON OF ANNUAL COSTS

Item	Present Machine	New Machine
Depreciation	\$ 156.67	\$ 346.67*
Interest, 3% on 1/2 Invest.	72.00	157.50
Insurance, 2%	96.00	210.00
Power	1,000.00	780.00
Maintenance	100.00	125.00
Value of Floor Area, @ \$2.00 per Sq. Ft.	60.00	32.00
Labor, Same for both		
Total Annual Cost	\$1,484.67	\$1,651.17

\*Straight line depreciation on 30 year life, less \$100 for scrap value.

# Problem:

A STEEL FABRICATOR NEEDED  
A SPECIAL ORDER OF STAINLESS  
STEEL PLATE WITHIN ONE WEEK



ALUMINUM MILL PRODUCTS  
INDUSTRIAL BUILDING PRODUCTS  
STEEL FLAT SHEETS  
BRASS & COPPER  
STAINLESS STEEL



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Savannah, Ga.

REYNOLDS ALUMINUM SUPPLY CO.

Established 1914

GENERAL OFFICES: ATLANTA, GEORGIA

AT 2 O'CLOCK on a recent Thursday afternoon, our sales representative in Tampa, Cecil Everidge, received specifications for an order of 88 sheets of Type 304 Hot-rolled, annealed and pickled stainless steel plate for the Plant City Steel Company. This large fabricator needed 44 sheets of  $\frac{3}{16}$ " plate immediately and 44 sheets of  $\frac{1}{4}$ " plate in one week. The salesman contacted our Miami office immediately to determine what could be done to fill this urgent order.

JOE BURNS, in our Miami office, found that the stock was not to be had in Miami or at any of our other nine branches. He contacted the Reynolds Aluminum Supply Company general office in Atlanta. The telephone hummed with calls from Miami to Atlanta to one of our suppliers, Eastern Stainless Steel Co. The report was made back to Joe Burns that the stainless steel supplier could make partial shipment immediately but would have to work a night shift in the mill to produce the full order on time. The order was placed at 3:00 P.M. on Thursday and the sheets of stainless steel were rolled that same afternoon. Shipment was made, not over the weekend, but the following morning. As a result, Mr. J. H. Levins, chief engineer for Plant City Steel Company, received the full requirement of 88 sheets the following Monday morning. This was a week less than the allotted time. His company, in turn, completed the deadline manufacture of the tanks for which the stainless steel plates were needed.

LARGE STORAGE TANKS for citrus concentrate were installed to specifications because of the service and attention this order received. This is the type of problem with which we are faced daily. Through the coordination of the stocks in ten warehouses and the close relationship with suppliers, our customers' problems are solved quickly and satisfactorily. Call in your Reynolds Aluminum Supply Company representative and talk with him about your requirements. He may well solve today's problems and contribute to tomorrow's profit picture for you.

# INDUSTRY SPEAKS



Honorable Luther H. Hodges, Governor of North Carolina, praises advances made by the Research Triangle Foundation of N. C. while Dr. George L. Simpson, Dir., Governor's Research Triangle Committee, points to the great potentialities of the Institute.

**WE HAVE COME** a long way since that day in January, 1957 when the Research Triangle Committee met in Raleigh and adopted what amounted to a 3-fold program for the development of the Triangle.

The first part of this program was to call the attention of industry and government to the fact that the Triangle area was an ideal location for research activity . . . in such fields as pharmaceuticals, electronics, chemicals, forestry products, etc.

The second part involved the development of a Research Park where land acreage could be available. Karl Robbins of New York City agreed to assemble the 4,000 plus acres of land known today as the Research Triangle Park.

The third portion of the initial program involved the establishment of a Research Institute similar to the Stanford (Calif.) Research Institute. The existence of three outstanding educational institutions in the park area with facilities that were conducive to the establishment of a contract research organization presented unusual opportunities.

Since the first announcement was made of the land purchase, Mr. Robbins and others invested a

total of \$750,000. It was figured that at least \$1,250,000 would be needed in addition — \$500,000 to complete land purchases and secure water, etc.; \$500,000 to operate the Institute for 3 years or until it became self supporting, and \$250,000 to erect a first building to house the Research Institute and the Triangle headquarters.

It was not feasible or practical to sell stock in this amount and the transition was made to a non-profit foundation. Archie K. Davis of Winston-Salem undertook to secure donations to the Foundation in the amount of \$1,250,000.

Earnings from the sale of the 4,200 acres of land will accrue to the Research Institute and also help pay off the Foundation's obligations.

Another goal has been reached. The Research Institute, which you will hear more about, is a reality.

**THE PROXIMITY** of three major institutions — the University of North Carolina in Chapel Hill, Duke University in Durham, and North Carolina State College in Raleigh, makes the Research Triangle of special interest to the industrial and scientific world. It is no more than a 15 minute drive to any one of the campuses and to the communities in which they are located. The industrial laboratory located in the Research Triangle will place the industrial scientist and his family in the midst of three universities, two of which are members of the Association of American Universities.



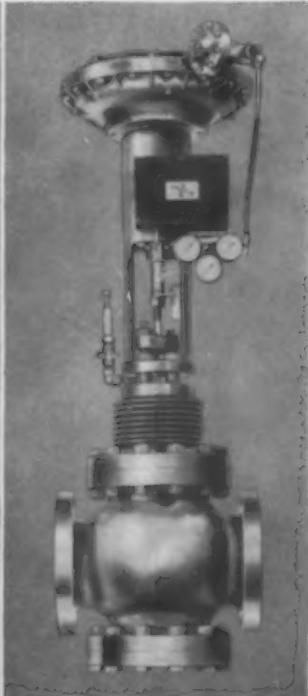
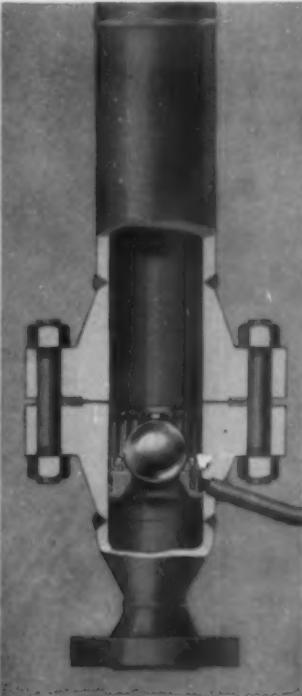
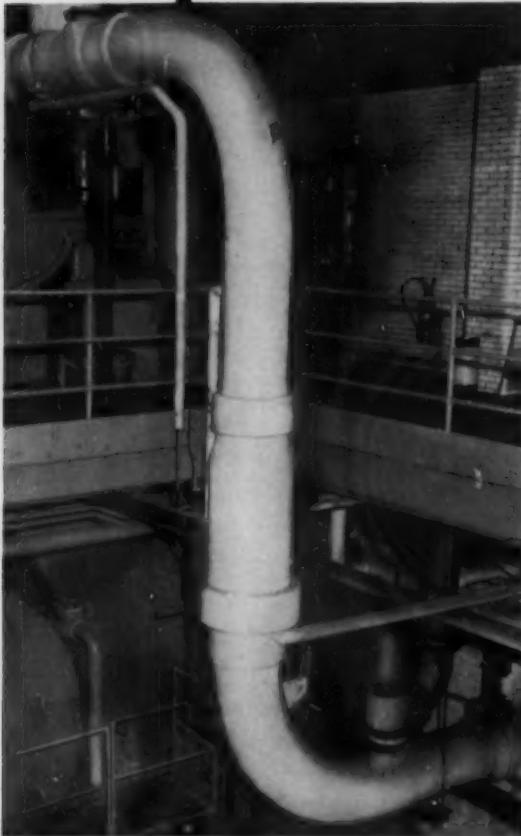
There are some 2,000 faculty members on the research and teaching staffs of these three schools drawn from every university in the nation, from many foreign universities, and in much of their work they are in the front rank of the advancement of knowledge. The three libraries have a total of 2,500,000 volumes and have virtually every scientific periodical available with all titles listed in a published checklist.

Of the 18,000 students enrolled about 1,200 are trained in the sciences

(Continued on Page 32)



How Copes-Vulcan control systems boost power plant efficiency



**Steel ball controls orifice opening.** Incoming steam lifts the ball in an amount determined by the weight of the ball and the amount of steam flow. Pressure drop of about 3 psig is held constant at all rates of flow.

**Copes-Vulcan valve . . .** for regulating desuperheater cooling water. Noted for accuracy and dependability, Type CV-D diaphragm-operated valve is available in sizes to 12-inch. Write for Bulletin 1027.

## New Copes-Vulcan Desuperheater handles the tough temperature control jobs

Using a unique design principle Copes-Vulcan's newly developed Variable-Orifice Desuperheater\* provides superior temperature control demanded on the most critical job. Installed in a steam header supplying a 12,500-kw turbine-generator, this desuperheater holds temperatures within a plus-or-minus 3°F limit—even though it is located just 20 feet upstream of the turbine throttle.

With only one outside connection and only one moving part, the Variable-Orifice Desuperheater simplifies maintenance. Skillful design eliminates the need for long runs of piping, atomizing steam, spray nozzle and glands.

The Variable-Orifice Desuperheater is one of several

types—each engineered to meet particular operating requirements. Write for Bulletin 1037.

### Single source . . . custom design . . . skilled service

Desuperheaters are a part of Copes-Vulcan's complete line of control systems for superheat and reheat temperatures, feed water, combustion and pressure reducing operations.

Available in separate units or integrated into a single package, these control systems are custom-designed to meet individual specifications, and are serviced periodically by experienced Copes-Vulcan field engineers. For a survey of the line, write for Bulletin 1022-B.

\*Patent applied for.

**Copes-Vulcan Division**  
**BLAW-KNOX COMPANY**  
**Erie 4, Pennsylvania**

## Industry Speaks — Continued from Page 30

are turned out each year either with baccalaureate or graduate degrees. Many of these people normally leave the state for suitable employment, although they would prefer to stay at home. The industrial laboratory is thus presented with an excellent annual supply of new talent.

For the industrial scientist at work, the three institutions will offer credit courses, at the undergraduate and graduate levels, at times convenient for the industrial scientist, and whenever the demand justifies such steps.

In the area of each basic subject, such as chemistry, physics and biology, there exists in these 3 institutions excellent undergraduate programs of teaching, and well-developed graduate-programs of training and research. Among the 3 universities are 2 schools of engineering, 2 schools of forestry, a school of textiles and a school of agriculture. Special equipment includes a nuclear reactor and a

Van de Graaf accelerator, together with advanced computing machines, including the latest Univac scientific electronic computer.

When the resources of the three schools are considered together, they present surprising concentrations in various fields, for example, pharmaceuticals and statistics.

The Raleigh-Durham Airport is located almost in the middle of the Triangle area. The industrial scientist may, therefore, live in an environment peculiarly suited to him and yet remain in close touch with executive offices and perhaps even production facilities located elsewhere.

Also, it is an outstanding area in which the industrial scientist's family may live. There are most of the advantages of a large metropolitan area without many of the disadvantages of congestion and noise and lack of space. Schools are excellent, building costs low, and life goes along at a steady

and fullsome pace.

It is felt by students of the southern economy that industrialization of the region has now proceeded to the point that a major center of research is not only desirable but feasible and realistic. Clearly the Research Triangle offers the soundest and broadest framework around which such a center may grow.

## REPRINTS AVAILABLE

**PAINT SYSTEMS:** A 16-page reprint by S. L. Terry of Southwest Public Service Company — describes a working system, including selection, cleaning and application.

**COAL HANDLING:** An 8-page reprint by the president of Stock Equipment Company — mostly about level controls and stoppage alarms.

**WRITE THE EDITORS** of SPI for a free copy of either or both of these plant aids.

## Facts and Trends — Continued from Page 7

- ◆ **POLYVINYL CHLORIDE AIR WASHERS** — Maybe this will solve your corrosion problem. Manufacturer says they are designed to handle acids, alkalies and corrosive fumes economically.
- ◆ **BOLTS FOR 1600 DEGREES** — Steel company states they are making the "first standard structural fasteners for such high temperature." Previous high was 1200 F for standard aircraft bolts.
- ◆ **TELEVISION WATCHERS** can talk back. Newly developed electronic system allows students in classroom to recite or ask questions to teacher in studio. Telephone circuits are used. Results in students and teachers becoming "integrated into a joint effort with full mingling of personalities."
- ◆ **TOTAL SOUTHERN STEELMAKING** capacity has almost doubled in the past 10 years, according to U. S. Steel's president, Mr. Wiebel, who spoke recently at Tuscaloosa.

Although Alabama has more than half of the Southern capacity, some other states are coming up fast. Texas has more than tripled its capacity in the past 10 years; Georgia and Oklahoma have doubled theirs; and Mississippi with no steel production 10 years ago, now can produce 45,000 tons annually.

Write the editors for additional information on any of the above items.  
**SOUTHERN POWER & INDUSTRY.** 806 Peachtree St., N.E. Atlanta 8, Ga.

# These 4 steps show why SPANG brings you the best galvanized steel pipe!

THOROUGH CLEANING of the pipe before galvanizing removes all dirt, grease and scale, leaves a clean surface for the prime western zinc galvanized finish.



STEAM-WIPPING of the pipe's exterior, as it comes from the kettle through an air ring, produces a smooth even finish that will stand up under rough usage.



SUPERHEATED STEAM blown through the pipe interior removes excess zinc inside, assures a smooth uniform surface for easy flow of liquids.



QUICK QUENCHING of the pipe in a sodium dichromate solution bonds the galvanized finish to the steel, adds extra service to the life of the pipe.

This is just part of the *quality-control* processing that each length of Spang Steel Pipe receives. Careful control from skelp through the inspection tables assures you of a *top-quality* pipe for *top-quality* installations. Next job, make it steel pipe... make it Spang! Your local Spang Distributor is at your service!



**THE NATIONAL SUPPLY COMPANY**

Subsidiary of Armco Steel Corporation



TWO GATEWAY CENTER, PITTSBURGH, PA.

Fig. 1. The basic magnetic unit a red multi-function device.

# LOGIC IN CONTROL

By G. F. FISCHER, JR., Industry Control Department  
General Electric Company, Roanoke, Virginia



**SIGNIFICANT** advancement has been made in the art and science of designing control systems during the past several years. Contact-making devices in the decision-making and information handling parts of the control are being replaced with static-magnetic and solid-state devices called "logic" units.

Logic units accept electrical signals from sensing elements, which measure speed, load, position, pressure, etc. Using built-in intelligence to interpret these signals, the logic units control a power amplifier which in turn performs the required function.

Several methods of applying logic units in control systems have been developed. One is Westinghouse Cypak and another is the General Electric Static Switching System. Both utilize logic units that are potted or encapsulated and have no moving parts. It is this latter feature, "no moving parts," that is of special interest. The absence of moving parts leads us to believe the promises of unlimited life, reduced downtime, ease of maintenance, great reliability, and minimum problems caused by adverse atmosphere.

General Electric Static Switch-

ing Systems now consist of eight basic logic units and the necessary static power supplies, static amplifiers and static regulators to provide completely static control systems. Five of the eight logic units are magnetic in nature. Two others mix signals for these magnetic units. The eighth unit is a voltage isolated switch which duplicates the electrical interlock of a conventional relaying circuit.

## Red Unit

The basic magnetic unit is a multi-function device, (Fig. 1). It can perform more than twenty-one different combinations of normally-open and normally-closed contacts (in relay terminology) or twenty-one different combinations of "AND," "OR," and "NOT" (in logic terminology). For ease of identification, the front of the basic magnetic unit has been colored red. Incidentally, all units have an identifying color.

The heart of the red multi-function device is a bi-stable magnetic amplifier, controlled in such a manner that the device either has an output or does not have an output. (A relay is also bi-stable, i.e., it is either energized or de-energized; or going one step fur-

ther, the relay can be thought of as having an output when energized, or not having an output when de-energized.) The schematic diagram for the red unit is shown on Fig. 2.

The characteristic curve is shown in Fig. 3. Signals or inputs on terminals A and B have been selected as positive. These signals are applied to a winding that turns the device ON or moves the operating point to the right on the characteristic curve. Inputs on terminals C, D, and E are applied to a winding which turns the device OFF. These OFF, or negative, signals move the operating point to the left on the characteristic curve.

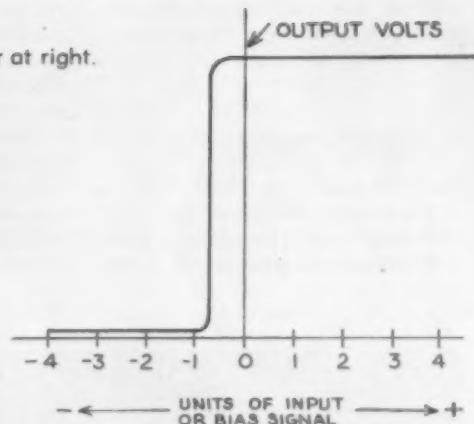
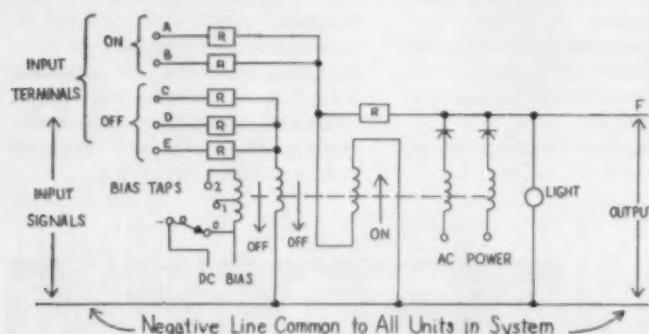
DC bias signals are applied to a winding which also turns the device OFF. This device without any signals applied to the terminals has a pulsating d-c output, between terminal F and common. This pulsating d-c at the output eliminates the need for phasing the static switching devices when interconnecting them. If a unit signal is applied to a negative terminal, the output drops to zero for all practical purposes. When the signal is removed from the negative terminal or a unit signal



*Relatively high first cost of static switching may be completely justified in many instances solely on the basis of reduced downtime.*

Fig. 2. Schematic diagram of red multi-function unit at left.

Fig. 3. The characteristic curve of a bi-stable magnetic amplifier at right.



is applied to the positive terminals, the device resumes its output.

You can see that if the algebraic addition of the unit signals is zero or positive the device has an output; conversely, if the algebraic sum of the unit signals is negative, the device has no output. This basic principle of ampere-turn addition by combinations of bias and negative and positive input signals is the reason this red unit can perform more than twenty-one different functions, or combinations of interlocks.

#### Blue Unit

The second of the devices utilizes a small d-c amplistat and is known as the blue multi-function device. This logic unit has three positive terminals and two negative terminals and can perform four combinations of functions. This particular device is used in systems that require a permanent memory.

In conventional relaying systems the generally accepted method of obtaining "permanent memory" is thru the use of latched-in relays or stepping switches. When power is removed, either intentionally or because of power failure, the control system "remembers" the point of power removal in the sequence of operation and continues the sequence from this point upon restoration of the power.

Since the blue unit has no latches, it performs the function of permanent memory by retaining its position on the magnetic saturation curve. If the core is saturated, the unit has an output;

and if power is now removed, the core will remain saturated. Upon restoration of power, the device will again have an output. Conversely, if the core is not saturated and power is removed, the restoration of the power input will be to an unsaturated core and the device will still not have an output.

The permanent memory feature is valuable in the control of assembly lines or conveyors because the control can match the physical condition of the line on power failure and restoration.

#### Black & Green Units

The third and fourth of the magnetic units are the black long (10 seconds max.) time delay unit, using an external capacitor, and the green short (.4 seconds max.) time delay unit, using the magnetic flux principle adjusted by an external resistor. The green unit has a time memory, that is, if power is lost and later restored, the timing will continue from the point at which power was lost.

#### Purple Unit

The purple unit, which has an isolated input, is the fifth of the magnetic units. This isolated input permits voltage isolation of the control signals, a familiar feature of the conventional relay. The schematic diagram of this unit is similar to the diagram of the red multi-function unit, except that the control windings on the core are insulated for 750 volts d-c. A typical signal would be a voltage signal from a motor armature

circuit. This duplicates the function of a voltage relay.

#### Yellow & Brown Units

The signal mixers are a yellow "AND" unit and a brown "OR" unit. The "OR" unit has an output as long as one or more of several signals are present. The "AND" unit only has an output if all the signals that are needed are present.

#### Gray Unit

Last, but not least, in the multi-function family is the isolation switch. The gray isolation switch has a transformer for circuit isolation. Thru a rectifier on the secondary side of the transformer the input signal is applied to the base of a transistor. The transistor acts either as a very small impedance (when excited) in the isolated circuit or it acts as an almost infinite impedance. The net effect is that the isolated circuit is either open or closed, the same action that the electrical interlock has in a relay circuit.

#### Fail Safe

All the units in this multi-function family which are magnetic in nature have a monitor light, connected across the output of the unit. The light is ON when the unit has an output and is OFF when the device does not have an output.

This system of static switching devices is "fail safe." One reason is that all units have a common series bias. If any one unit is removed

or loses bias, the common circuit is broken, and power for all units is removed.

### COST COMPARISONS

Cost comparisons with relays on a one-for-one basis do not tell the whole story. Some applications will not economically justify static

switching, while in others the cost is justified by the benefits derived. Static switching may cost from 80% to 500% of an equivalent relaying system.

The cost spread varies with the following items:

- A. The number of output signals required.
- B. The number of logic functions per output.

C. The requirements for memory, monitor lights and atmospheric insulation.

D. The total number of logic functions required.

It is important to keep in mind that first costs may be relatively unimportant. Static switching is completely justifiable in many instances solely on the basis of reduced downtime.

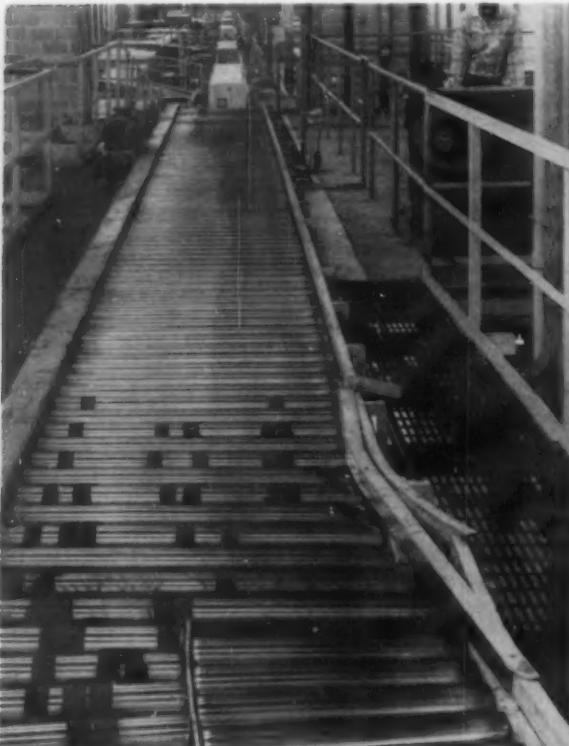


Fig. 4. Warehouse area showing spurs off main conveyor line.

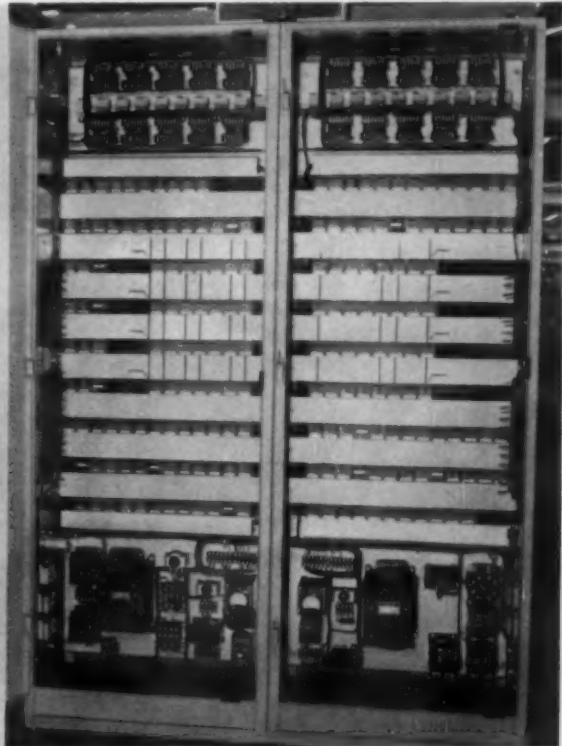


Fig. 5. Static Switching Control Panel.

*Louisville, Kentucky . . .*

### Plant Tested Static Switching System

**AN EXCELLENT** industrial application is found in the warehouse of General Electric's large appliance manufacturing plant at Appliance Park, Louisville, Kentucky. The conveyor dispatching of crated appliances involves a complex control scheme, a memory requirement, highly repetitive control operations, reliable operation, process monitoring and continuous

production. Specifications were as follows:

1. Minimum storage space was available at both in the production area and at the end of the conveyor. In fact a shutdown of the warehouse section of the conveyor would cause a complete production shutdown in 25 minutes.
2. All dispatching to be done by

one operator as the products passed the dispatch point.

3. All products arrive at the dispatch point crated for shipping and in trains consisting of one or more crates. Each train will consist of the same model and color. No train is to exceed approximately 30 ft in length and trains are to be spaced approximately 60 ft from the head of one train to the head of the following one. However, there may be empty trains, thus causing empty spaces in multiples of 60 ft each.

4. Once each train has been dispatched, it is to proceed to the selected spur. If the system is shut down at the end of the work shift, or because of a power failure, it is to deliver previously dispatched trains to their original destinations upon restoration of power. The system must, therefore, have memory; even if the shutdown is for a long period of time, such as a week-end.

5. If for some reason the selected spur is full when the train arrives, it must proceed automatically to the next open spur on the same side of the building.

6. Trains will not arrive at the dispatching point in any particular order. In fact, they will be loaded on the transport conveyor which passes the end of each production line in accord with the space available. Thus a train of pink stoves might be followed by one of yellow refrigerators, each train destined for a different railroad car or truck. The dispatcher will work from a previously prepared list telling him where to send each train.

The warehouse conveyor system, (Fig. 4) consists of 9 spurs. On the left side of the building, 4 spurs lead directly to the shipping platforms served by freight cars and trucks, and 1 spur leads into the storage area. On the right side 4 spurs lead directly to the shipping platforms. The main conveyor line proceeds through the middle of the warehouse, ending up as spur 9. The intermediate spurs are operated by motor driven switches. The whole system is sectionalized for ease of maintenance.

A study of the system and the specifications revealed that a complex programming control was required and that it must be trouble-free. Because there is a certain amount of slippage between the crates and the rolls, it would not be possible to rely on a control system that checked position by timing or mechanical means.

A control system was devised (Fig. 5) such that coded signals literally followed each train through the system until it reached the selected spur. Check points of photoelectric relays would be

at various points along the conveyor. Static switching systems were chosen to accomplish the programming from the initial selection of the proper spur by the operator to the delivery of the train into the selected spur.

The static switching part of the system operates as follows: When a train enters the dispatching area, it produces a "select" signal in the control panel through a photoelectric limit switch. This signal lights a light informing the operator to make his selection and he presses the proper spur pushbutton (Fig. 6). If after a definite time, he has not made a selection, a buzzer sounds and he still has time to make a selection. When the train reaches the end of the dispatching zone the "select" light goes out and the train proceeds into the warehouse.

Once this limit has been passed, the operator can no longer direct that particular train, because now the train is under the control of the static switching system. If he has failed to make a selection in the dispatching zone, a horn will sound and the train will proceed automatically to spur 9. On the

Fig. 6. Conveyor "train" entering select zone.



## In Your Plant . . .

Logical applications for static switching systems appear when you have:

1. Complex control systems.
2. Adverse atmospheric conditions.
3. A memory requirement.
4. Highly repetitive control operations.
5. A need for reliable, silent operation.
6. A need for visual process monitoring.
7. Unscheduled downtime.

Put logic in control. Static switching systems, well thought out and properly applied, may be the answer to your problem.

other hand if he makes a wrong spur selection while the train is in the dispatching zone, he may cancel and re-select as long as he completes the change before the "select" light goes out.

Assume that a particular train has been selected by the dispatcher to go to spur 4. As the train proceeds down the conveyor, its code, set up by the spur selecting pushbutton will follow it in the control system. When the train reaches spur 4, it will actuate the photo-electric relay check point and since the train's code matches the spur code a signal will be given to operate the switch.

If the spur is not blocked the train will enter the spur and when it is completely clear of the switch, a signal will be returned to the control panel which will cancel the code assigned to and following this train. If the spur is blocked, the train will continue down the conveyor. If the next spur on this side (in this case spur 7) is not blocked its control will accept

the train code when the train reaches the photo-electric check point and the train will enter spur 7 in the same manner as described for spur 4. If spur 7 also happens to be full when the train reaches it, the train will move automatically into spur 9. In the normal operation of the conveyor this would not happen as the warehouse has approximately double the delivery capacity required to handle normal production.

Trains dispatched to the other side of the building will follow the same pattern of operation except that spur 5 will receive only those trains dispatched to it. It will never receive trains dispatched to other spurs nor will trains dispatched to it ever be sent to spurs 6 or 8. It is assumed that this spur will never become jammed since only a limited number of units will be sent there.

Including the dispatching portion of the conveyor not more than 15 trains can be handled on the warehouse portion of the main

conveyor at any one time. The location of the trains will be checked at each of the 8 spur switches.

The control system may be said to consist of two parts, the train following part and the switch coding part. The train following part is called a shift register in which the train code will shift from one section to the next as the check points are passed. The registry in the preceding section will be cancelled after the shifting to the next section is complete.

In order to simplify the shift register a binary code number is assigned to each spur. Each spur is set up to receive certain of these codes. Spur 1 will receive code 1 only, spur 6 will accept the correct combination of codes 1, 1 + 2, and 2 + 4. As each check point (at entry to the switches) is reached by the train code, if the sum of the code matches, a signal to turn the switch will be generated and the train will be discharged onto the spur. As soon as the train has cleared the switch its code will be cancelled and space will be made available for accepting another train in the control system. In the case where a spur is full the switch will not recognize the signal to turn and the train will proceed to the next switch that will match its code.

The shift register control continues to shift and cancel signals in this manner, tracting each train through the system to its destination.

In this conveyor dispatching system, static switching met all the requirements of the job and in addition it was an economical solution to this problem.

## Centrifugal Pump Equalizing Line

A **PRESSURE** equalizing line was installed between the outboard packing gland and the suction line on a two-stage centrifugal pump to reduce the pressure on the outboard gland.

Installation has permitted continuous operation of the pump for a period of over four months. Prior to this, it was necessary to

shut the pump down periodically to replace the packing in the outboard gland because of leakage through and subsequent loss of the packing due to the high pressure.

On several occasions damage has occurred to the pump shaft because of the sudden loss of packing with the resultant metal-

to-metal contact of the packing gland holding member and the shaft.

Generally pumps of this type have a built-in or external "bleed back" or equalizer system from the outboard gland to the pump suction but for some reason the pump mentioned above was not so equipped.

By **RICHARD H. PRING**, Machinst, Baytown Refinery, Humble Oil & Refining Company, Baytown, Texas.

## TELEVISION MONITORS

**OPERATOR** at Kansas Power & Light Company's Tecumseh Power Station makes adjustments on main control panel. Four General Electric closed-circuit television monitors on the panel allow him to make adjustments on boilers at a remote location.



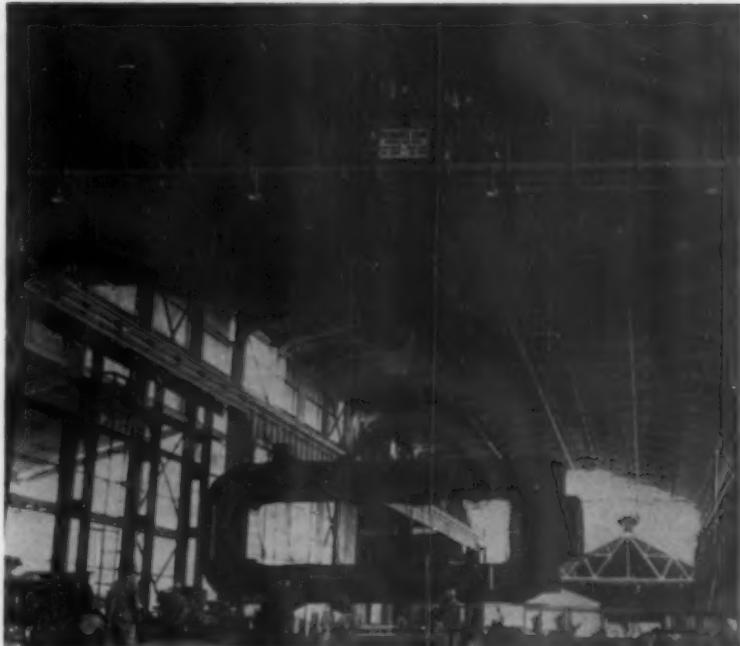
## Largest Aluminum Crane - - - Sheffield, Alabama

**THE WORLD'S LARGEST** over-head aluminum crane is used to move a 200-ton housing for the world's largest aluminum hot rolling mill, both part of the current \$65,000,000 expansion at the Reynolds Metals Company Alloys Plant near Sheffield, Alabama.

The giant aluminum crane is more than 50 tons lighter than an equivalent strength steel crane, permitting a corresponding saving in the cost of building supports and structural members. Fourteen aluminum overhead cranes are being used in the new Reynolds plant.

The 150-ton rated capacity crane pictured has an overall height of 32 feet and an 80 foot span. Construction engineers said that in lifting the almost 200-ton housing, the crane had only a fraction of an inch momentary deflection.

In fabricating the crane Milwaukee Crane Division of Industrial Enterprises, Inc., used aluminum plate in thicknesses of



one-half inch and 2½ inches, produced at Reynolds Metals' McCook

plant near Chicago. The plate is 5083-H113 aluminum alloy.

*The careless safety chairman . . .*

*Didn't stick to the rules . . .*

# "Big Red" O'Connell



By JOE TABB  
Macon, Georgia

JOSEPH L. TABB, JR. has had over 10 years training experience in diverse business and industrial fields — warehousing, merchandising, metalworking, textiles, pulp, paper, and building supplies. His educational training includes Emory University and the U. S. Army and Air Force Schools of Personnel Administration.

**ANY SAFETY** chairman worth his green badge is proud of a good safety record. Even the hint of a lost time accident makes his temperature go up a few degrees. In one particular incident, safety chairman "Big Red" O'Connell almost had a stroke.

The official weather report gave a temperature reading in the high nineties, but inside the sheet metal warehouse the thermometer registered a humid 106. Construction on the new multi-million dollar mill was running behind, and some supplier had "goofed" on a shipment of chipper blades.

"Big Red," the superintendent as well as the safety chairman, called and asked Tim Turner, purchasing agent, to meet him in the warehouse so that they could check the chipper blades.

In the warehouse, Tex Dodd, the storekeeper, pointed out the heavy cases stacked three high in the receiving bay. "Big Red" instructed Tex to pry the cover off one of the boxes on the top of

the stack so that he could inspect the blades. When he found it difficult to remove a blade because of the tight packing, "Big Red," with the help of Tex, proceeded to turn the case on its side.

Then it happened.

The thirty pound blades, which were sharpened to a razor like edge, started sliding from the case toward the floor.

All three jumped toward safety. Tim, the purchasing agent, didn't quite make it. One of the blades struck him just below the knee, sliced through a part of the muscle in the calf of his leg, landed on his foot cutting completely through his shoe, and almost severed his little toe.

Here is a situation where nobody wins. "Big Red" and the company have a seriously marred safety record before they get a single ton of production out of the new mill. And by no means of lesser importance, Tim has a painful injury that will keep him from urgent duties for a good many days.

## DISCUSSION —

Let's look at some facts that may not be obvious, but that have a bearing on this accident:

1. As a matter of information, "Big Red" was the only man involved who had prior paper mill experience. Tex and Tim were both well qualified in their specialties, but had been recently hired from other industries.

2. "Big Red" was not only deeply "sorry" — he was embarrassed. Promotion of safety had been an important part of his career for many years. He was not the type of man to "pass the buck" — he

readily accepted what was probably more than his share of the blame.

3. Haste, accented by the intense heat, played a part in this situation.

4. We do not know about the others, but Tim was in a dangerous area without wearing safety shoes. The records indicate that materials handling is one of the most common sources of industrial injuries.

5. All of the people involved in this incident were members of management. It is not uncom-

mon for management people to expose themselves to hazards which would be the subject of severe criticism if observed in subordinates.

6. Most accidents are not caused by the obviously dangerous situations. No man in his right mind would put his hand across bus bars in a high voltage panel; but many of us ignore simple hazards that *may* kill, cause permanent injury, or cause painful injury to a fellow employee. Just because an unsafe practice *may* not get us this time, some of us are inclined to treat it lightly.

## HINDSIGHT —

"Hindsight" will not heal the cut in Tim's leg and foot. Neither will it keep "Big Red" from feeling very badly about the injury to his friend; but, he learned from it, and so can the rest of us. Here are some points to remember:

1. This accident could have been prevented, as most of them can

be, by sticking to the rules of safe work practices. It would have been a simple matter to have placed the case of chipper blades on the floor before opening.

2. Use of appropriate safety devices (in this case, safety shoes) can greatly minimize the effect of an accident if it does happen.

3. Training in the safety aspects of a job is just as important, and frequently more critical, than training in job skill. The safe way to do a job is the best way to do a job. It cannot be assumed that because an employee was trained and qualified in another company that he will recognize the hazards in a new work situation.

## CONCLUSION —

Management people at all levels, from "straw boss" to company president, have a responsibility to set a perfect example for subordinates to follow. If the "brass" are prone to short-cut their own safety requirements they are, in effect, rescinding every rule in the book. In our way of life, precedents frequently outweigh the "letter of the law."

The old saying that "haste makes waste" certainly applies

in this situation. The pressure of the job, the frustration of a fouled-up shipment of critical parts, plus the weather contributed to the failure of a strong advocate of safety to put SAFETY FIRST when the heat was on.

Safety is a way of life — not a set of rules. You live it by constantly being alert to avoid these traps:

— Saying that it could hap-

pen, but that it *may* not this time.

— Haste

— Saying that "I'm too much experienced — that rule is O.K. for beginners."

— Forgetting that SAFETY is FIRST in our way of living, in our supervision, and in our training of new people.

# Absorption Refrigeration

By E. LEON DUNNING  
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Engineering, Louisiana Polytechnic  
Institute, Ruston, Louisiana.



WITHIN the past few years the use of absorption systems has increased considerably — especially industrial installations. For instance, the Dallas, Texas area reports an increase in the use of absorption systems over the last three years of about fifty per cent.

Several recent industrial installations are now in operation throughout the South and Southwest. The Shell Oil Company of Deer Park, Texas has an installation of 800 tons. The Dow Chemical Company, Freeport, Texas has two installations, one of 500 tons and one of 1,000 tons. Cities Service Refinery Corporation, Lake Charles, Louisiana has a 1,550 ton installation.

THE FUNDAMENTAL ideas of absorption refrigeration date back to the early nineteenth century. The first successful absorption refrigeration machine being built by Ferdinand Carre, a Frenchman, in the year 1850. The first large ice plant in the United States was put into operation at New Orleans in 1866, the machine being operated under the Carre patent.

It is the purpose of this article to present a short review on absorption refrigeration and to discuss a simple system.

Several factors contribute to the recent increase in the use of absorption refrigeration equipment. The following list of characteristics of an absorption system gives an idea as to its suitability for the specific applications.

1. Where cheap fuel or waste steam from other equipment is available, absorption system can usually be adapted for economical operation.
2. There is no large maintenance problem and quiet operation can be expected. The only moving part is the aqua pump.

3. At lower than capacity load, the absorption system is almost as efficient as at full load.
4. Absorption units can be located outdoors, thus requiring no housing.

## Description of Units

The small absorption units have not acquired the popularity of the mechanical unit. In view of this, the discussion to be carried out here is to be confined to the larger absorption systems.

The absorption type refrigeration system necessarily contains

four main components: a generator, condenser, evaporator, and absorber. The refrigerant most commonly used is a solution of water and ammonia called aqua-ammonia. Other combinations of some chemicals may be used depending upon application.

The refrigerant during its cycle through the system becomes alternately strong and weak — a strong solution being one with a high concentration of ammonia and the weak, one with low concentration.

The generator contains an aqua-ammonia solution, when heat is added to the generator, the ammonia boils off and is carried to the condenser. The use of a bubble column in conjunction with the generator is quite common, its use

being to improve the purity of the ammonia gas entering the condenser.

In the condenser, which is usually water cooled, the ammonia vapor becomes a liquid. This liquid then passes through the expansion valve and into the evaporator where it absorbs its heat of vaporization.

The vapor, and sometimes, a small amount of liquid leaves the evaporator and enters the absorber where it is absorbed in the weak solution which returns from the generator. Since heat is given up during the absorption process, cooling is needed in the absorber.

Two pressure differences occur, considering the small pressure drops through the components as

being negligible. Therefore, a pump is needed to return the strong solution from the absorber to the generator. Likewise, a pressure reducing valve is needed in the return line from generator to absorber.

The simple cycle, which contains the components discussed above, has a low efficiency. But in the practical system, heat exchangers and other refinements are added which improve the efficiency tremendously.

### The Simple Cycle

The accompanying diagram shows a simple absorption refrigeration cycle. Referring to the diagram, the various conditions of the refrigerant about the cycle are indicated by letters atop and are explained in the caption.

The efficiency of an absorption refrigeration unit is not spoken of as such, but the relative performance of any unit is compared by the use of the performance factor of the system. The performance factor is the ratio of the heat absorbed in the evaporator, sometimes called the refrigerating effect, to the heat supplied to the generator.

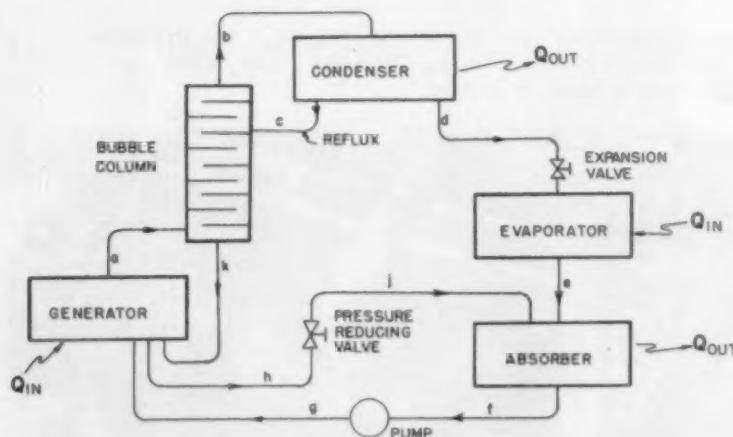
### Analysis of System

To analyze the simple cycle, the evaporator, absorber, and generator are assumed to be operating at equilibrium conditions; and operating temperatures and pressures must be known for each component. Heat transfer in the piping can be neglected. The proper reflux ratio (weight entering evaporator to the weight returning to the bubble column from the condenser) must be known. The enthalpies and ammonia concentrations can be obtained from aqua-ammonia concentration data.

By following usual principles of thermodynamics individual elements of a system such as the evaporator, absorber, pump and condenser may be analyzed. But examples of these calculations are omitted here for the sake of brevity and because such detailed calculations are usually handled by the equipment manufacturers rather than the users.

The basic formula for perfor-

SIMPLE ABSORPTION SYSTEM



- a—Ammonia vapor leaving the generator with a small amount of water vapor present.
- b—Ammonia vapor, almost pure, leaving the bubble column.
- c—Liquid ammonia returning to the bubble column as a reflux.
- d—Liquid ammonia leaving the condenser and entering the expansion valve.
- e—Ammonia vapor leaving the evaporator. This stream may also contain some liquid, de-
- f—Strong solution leaving the absorber at low pressure.
- g—Strong solution leaving the pump and entering the generator at high pressure.
- h—Weak liquid solution leaving the generator.
- i—Weak liquid solution entering the absorber.
- j—Water with a small amount of ammonia leaving the bottom of the bubble column.

mance factor is:

Q in evap.

$$P.F. = \frac{Q \text{ in evap.}}{Q \text{ in gen.}}$$

$$P.F. = \frac{[W_a(h_b - h_a)] + [W_c(h_b - h_a) + W_d(h_b - h_a) + W_i(h_b - h_a)]}{[W_c(h_b - h_a) + W_d(h_b - h_a)]}$$

Subscripts in each case refer to the flow stream as indicated on the diagrams. Meanings of the symbols are:

Q—Heat, Btu per hour.

W—Weight of solution, pounds per hour.

h—Enthalpy of the solution, Btu per pound of solution.

From more complete analyses the design requirements can be easily determined, i.e., the heat required to be supplied to the generator, the cooling required for the condenser and the absorber, and from the evaporator load the weight of refrigerant circulated can be obtained.

### Operation Costs

There may be slight cost variations depending on the various factors involved. For the practical system, one manufacturer of absorption machines reports that with 12 psig waste steam as the heat source, the steam consumption rate is about 19 pounds per hour per ton. Another manufacturer indicates that with 3.2 psig steam the consumption rate is about 24.6 pounds per hour per ton. The aqua pump requires about .046 kwh per ton. Operation of the unit can be automatically controlled regardless of the size of the system.

In general, where a cheap heat source is available, the absorption type refrigeration machine becomes very attractive.

### Conclusions

From the present status of ab-

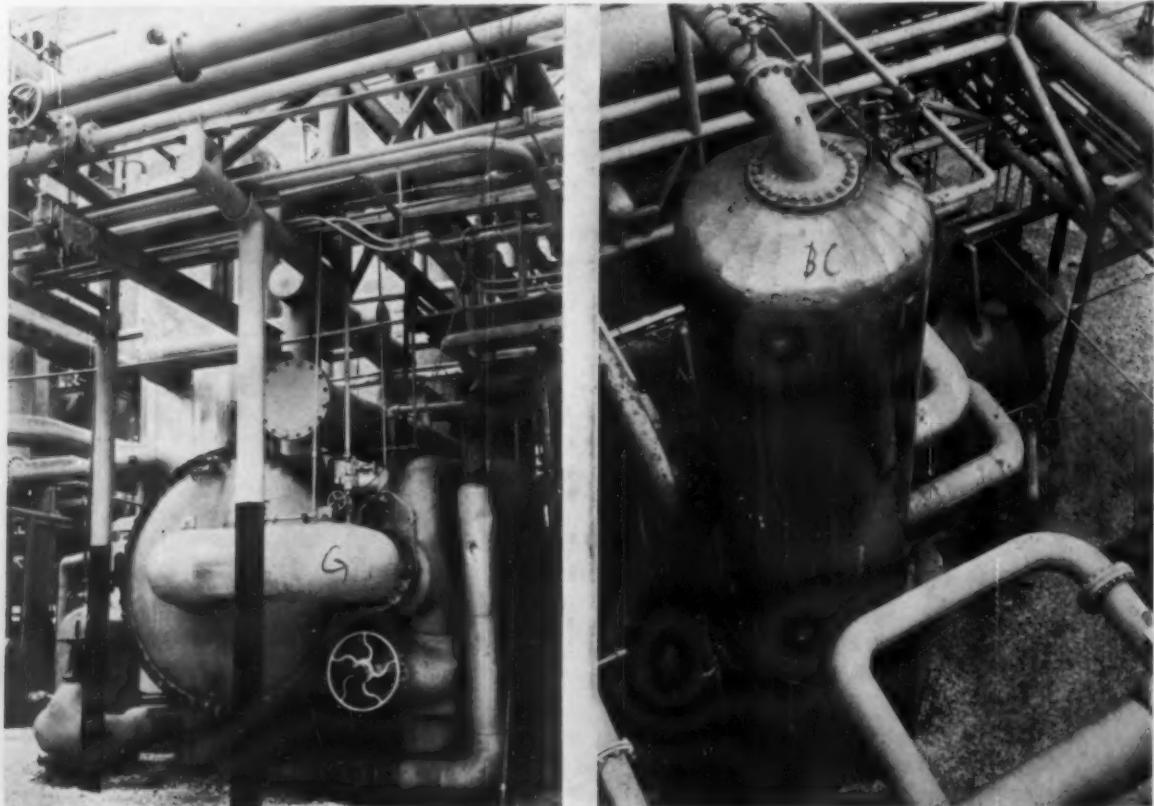
sorption refrigeration, it can be concluded that:

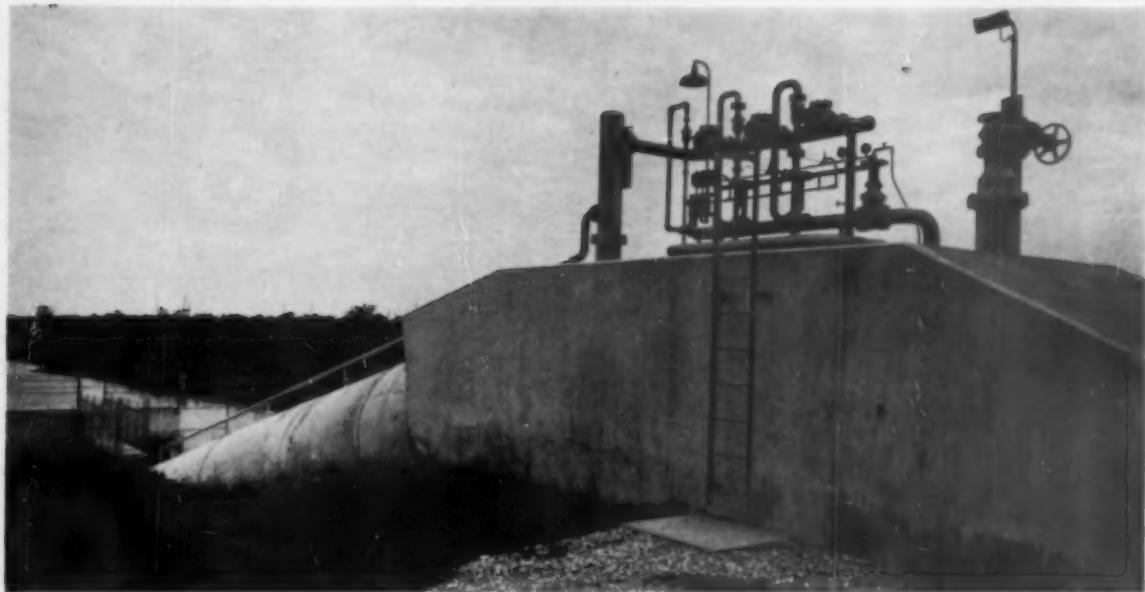
1. When the need for a large refrigeration system is required, the use of an absorption unit should be investigated.
2. From an analysis of the system the various requirements can be determined.
3. The performance factor is much greater in the practical system than in the simple system.
4. If the bubble column is used, the reflux should be investigated as to the proper amount for most efficient use, since the amount of reflux returned has a substantial effect upon the efficiency of the system as a whole.

### References

1. Jordan, R. C., and Priester, G. B., *Refrigeration and Air Conditioning*, 2nd ed., New York: Prentice Hall, 1950, Chapter 15.
2. Rencora, Charles L., "An Absorption Refrigeration System May Be Your Answer," *Refrigerating Engineering*, March, 1958.

Photographs showing two views of the generator and the bubble column in the ammonia absorption system of Cities Service Refinery, Lake Charles, Louisiana. Photo at left shows generator in foreground. At right, bubble tower is in front.





View of 90" Circulating Water Discharge Pipe  
Installation of the water jet air eductor system.

over levee to Discharge Canal showing in-

### **Louisiana Engineer Reports Tests on Air Exhausters**

## **Eductors Help Water Over the Hump**

**THE MICHoud** Steam Electric Station of New Orleans Public Service Inc. is 10 miles east of New Orleans on a flat area two feet above mean sea level. Condensing water is taken from the Intracoastal Waterway over a storm levee which rises to 11.5 feet above sea level.

The Station presently has one nominal 100,000 kw, 1450 psig, 1000 F turbo-generator. Steam for the turbine is generated by a non-reheat boiler rated at 975,000 lb/hr and is condensed in a 90,000 sq ft condenser. All equipment essential to the operation of the station has been installed with vulnerable operating parts either above 10 ft elevation, or capable of operating immersed.

It was necessary to comply with government requirements that no pipes should be installed through

**By HOWARD C. McAfee**  
New Orleans Public Service Inc.  
New Orleans, Louisiana

the levee. Consequently, the circulating water piping passes over the levee.

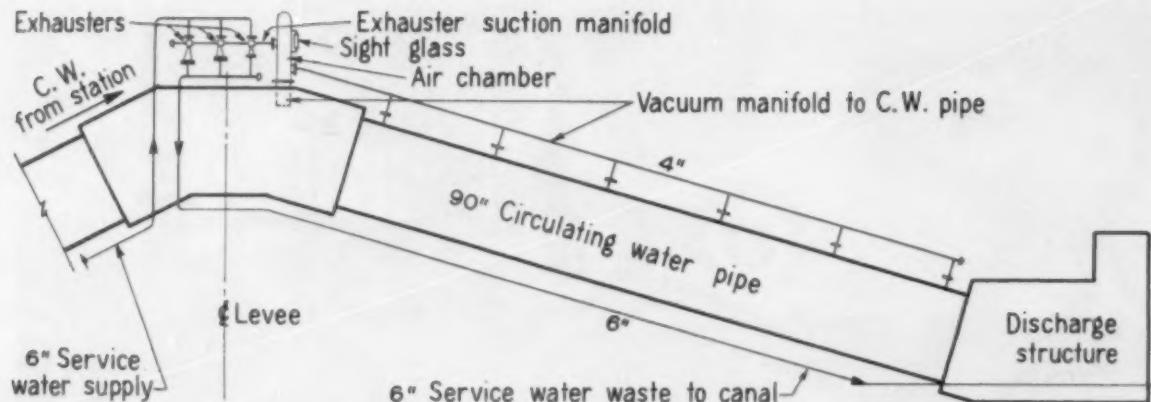
The two circulating water pumps are on the waterway side of the levee and are rated together at 75,000 gpm. Delivery is through a 66" reinforced concrete pipe over the levee to the condenser. Water from the condenser is passed through a 90" concrete pipe over the levee again and into a canal which delivers the water back into the Intracoastal Waterway. The discharge pipe is large enough to serve two units.

Because of the fall of condenser discharge water down to the canal from the high point over the levee, a partial vacuum is created; and

consequently, air is released from the water. Unless this air is evacuated the piping tends to become airbound, the result of which is increased pumping head and decreased capacity of the pumps. This condition was anticipated in the design of the station and three Schutte and Koerting water jet eductors were installed to remove the air. The eductor installation was designed for two turbine-generator units.

Eductor No. 1 has a capacity of 1.4 cfm at 20" Hg vacuum. No. 2 is rated at 2.8 cfm, and No. 3 is 5.6 cfm.

The suctions of these eductors are installed in a common manifold connected directly to an air



Schematic Diagram Showing Arrangement of Water Operated Jet Air Exhausters in C. W. System — New Orleans Public Service, Inc., Michoud Steam Electric Station, Unit No. 1.

chamber at the top of the circulating water pipe where it crosses over the levee. In addition, the air chamber is connected to a 4" suction manifold which in turn is connected to outlets installed at several places along the top of the water pipe as it slopes down the levee.

#### Tests of Eductors

Tests were conducted with various combinations of eductors in service as shown in the table.

It is apparent from the test data in the table that the eductors, when in operation, serve to lower the pumping head on the circulating water pumps, with the result that

the flow of circulating water is increased. In addition, the power required for the pumps increases as eductors are removed from the system. Consequently, in the range tested, operation of the eductors results in more circulating water with less consumption of power.

The condenser was designed for 6.5 fps water velocity in the tubes with 74,750 gpm of circulating water flowing through the condenser. Calculated tube velocities at the flows as tested are included in the table and are somewhat in excess of the design velocity at 6.5 fps.

The temperature of the inlet circulating water remained virtually constant during the tests. Also,

the electrical load on the generator was maintained constant. This being the case, it was assumed that the changes in steam condenser back pressure during the tests were entirely due to the change in quantity of circulating water.

It is evident from the results obtained that a considerable quantity of entrained air is released from the circulating water at the high point of the pipe over the levee.

With three evacuators operating, a negative pressure was measured at the centerlines of the outlet water boxes of the condenser. Also, it was noted at the same time that the gage glasses indicated that the

TABLE 1 — TESTS ON AIR JET EDUCTORS WITH BOTH PUMPS OPERATING

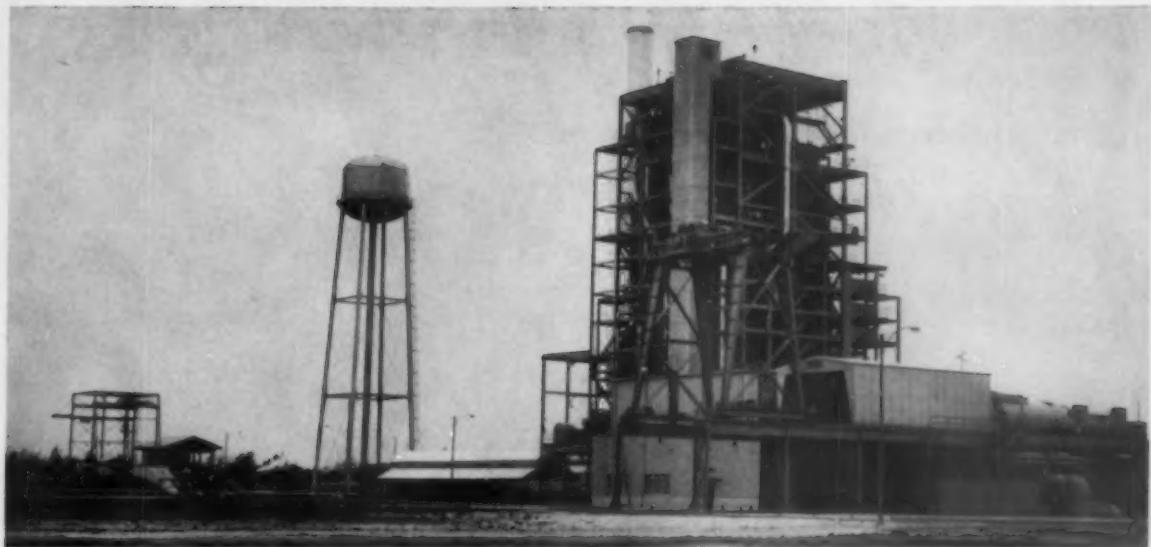
Eductors On*	1, 2, 3	2, 3	1, 3	3	1, 2	2	1	None
Vac. at High Point**	15.9	15.9	13.4	11.2	8.3	8.3	8.1	8.1
CW Inlet Temp F	84.5	84.5	85	85	85	85	85	85
CW Outlet Temp F	97.0	97.0	97.2	97.8	98.0	99.0	99.0	99.0
TDH E Pump (Ft)	20.86	20.81	21.12	24.15	25.52	25.73	26.02	26.02
TDH W Pump (Ft)	20.75	20.80	20.99	23.94	25.39	25.60	25.89	25.89
CW Flow (gpm)	83,800	83,800	83,000	80,750	77,900	76,100	76,000	76,000
Vel. thru Tubes***	7.28	7.28	7.22	7.03	6.78	6.62	6.61	6.61
HP Input, E Pump	273	273	273	290	294	297	297	297
HP Input, W Pump	273	273	277	294	297	305	305	305
Station Readings								
Throttle Press psig	1500	1500	1505	1510	1515	1515	1515	1515
Throttle Temp F	988	988	987	988	987	989	990	990
Steam Flow K lb/hr	800	800	800	800	800	808	805	805
Blr Fd Temp F	432	432	432	432	432	432	432	432
Gross Generation (mw)	100	100	100	100	100	100	100	100
Cond. Shell (In. Hg)	1.97	2.00	2.01	2.05	2.06	2.09	2.09	2.09
Waterbox Inlet****	+5.9	+5.9	+6	+9	+10	+10	+10.1	+10.1
Waterbox Outlet****	-1.5	-1.5	-1.3	+2.93	+4.3	+4.6	+5.0	+5.0

\* Eductor No. 1 is small, No. 2 medium and No. 3 large.

\*\* Reading taken at top of CW discharge pipe over levee (Inches Hg).

\*\*\* Based on design velocity = 6.5 fps at 74,750 gpm through condenser.

\*\*\*\* Water pressure at centerline of water box (In. Hg).



View of Michoud Station. Levee beside waterway is at left.

outlet water boxes were not completely full, due to the negative pressure.

#### Operation Effective

The tests on the eductors have shown conclusively that their operation effectively reduced the pumping head, with a resultant increase in quantity of water pumped. At the same time back pressure on the steam side of the condenser was lowered. It, therefore, can be presumed that heat cycle efficiency was improved.

#### Disadvantages

Tube failures in another station of New Orleans Public Service Inc. using similar circulating water are believed to be associated with excessive tube velocities, among other factors. Hence, the decision was made, when considering condenser design for the Michoud Station, to use a lower design tube velocity of 6.5 fps.

Use of the eductors served to increase the tube velocities considerably above the design velocity of 6.5 fps. As a consequence, the higher velocities, occurring when the eductors are operated, could result in higher incidence of tube failure.

In addition, in our opinion, it is objectionable to operate with excessive negative pressures in the water boxes.

The expected resultant higher maintenance costs of operating with the higher tube velocities and excessive negative pressures in the condenser tend to offset the advantages of better heat cycle efficiency.

#### Conclusions

Because it is not positively known to what extent the increase in tube velocities will hasten tube deterioration, it cannot be definitely shown at the present time that

operation of the eductors will actually be beneficial at the Michoud Station, when any improvements in operating costs are balanced against expected increases in maintenance costs. Therefore, the decision has been made not to operate the eductors regularly until more maintenance experience is available. Their use will probably be definitely required after the installation of the second turbine-generating unit, which will discharge through the same 9" pipe.

## Shop Press

FOR machinery rebuilding operations we have found this simple but effective air-powered press does a vast variety of operations where press-fitting is required.

An old truck air brake chamber powers the downward piston stroke, with a Branick pressure regulating valve to control gradual press-fitting.

Holes in the channel iron uprights lend the needed adaptability to different sizes of press jobs.

By STANLEY CLARK, Mayo Welding Service, East Bradenton, Florida.



*Thinking about the systematic training of personnel? Take a look at this plant-tested program from the Southwest . . .*



## **THIS Program PAID OFF**

FOUR YEARS ago, the Southwestern Public Service Company designated E. W. Love as System Training Supervisor. This was the beginning of a 20-Vocational School Program which today means not only training of new personnel but continuous training to meet changing technology. It includes apprentices, journeymen, foremen and supervisors.

Southwestern is an independent utility with local management. In 1942 headquarters were established in Amarillo, Texas. Today, more than three quarters of a million people depend on Southwestern for electric service throughout its 45,000 square mile service area which centers in the Texas Panhandle and spills over into Okla-

**By W. C. RHODES**

Director of Personnel  
Southwestern Public Service Company, Amarillo, Texas

homa, New Mexico, Colorado and Kansas. Generating units the company is now installing will bring capacity to 818,600 kw as against 112,100 kw in 1943.

This is one training program where there is no friction between management and labor. Both heartily endorse the program and work for its success. Management bears the financial burden and, through the Training Department, writes the textbooks and prepares lesson plans and instructor courses. Films and viewgraphs are used extensively.

Members of the Union involved,

International Brotherhood of Electrical Workers, Local No. 602, serve on Joint Apprenticeship Committees of which Division Training Supervisors of the company are usually chairmen. These committees range from four to six members with equal representation of management and labor.

The JACs meet monthly and administer the Vocational Training Program. They review instruction material to see that it is both technically correct and practical; assess training aids; and make recommendations as to which employees should receive completion



Four year courses include 8,000 hours of on-the-job training and 576 hours of related classroom instructions. Here is a practical session in the Linemans and Electricians School. R. E. Benesch, Substation Superintendent is discussing meters and transformer equipment.

On the opposite page the Training Committee is planning the Vocational Training Program. Frank Youngblood (extreme right), Field Representative for the Bureau of Apprenticeship and Training and E. W. Love (2nd from right), Training Supervisor, attend as observers.

certificates. They do not have the right either to hire or fire a participant.

#### Vocational Schools

The twenty Vocational Schools, spread through the five Company divisions, each has a JAC, and each Division has a Training Supervisor employed by the company.

The twenty Vocational Schools are divided into ten linemen schools and ten plant schools. There are twenty instructors in linemen schools and twenty in plant schools with half teaching

theory and half practical application. Classes are kept as near 12 students as possible with 23 a maximum, meeting requirements of the Texas Education Agency which cooperates in the program.

The four-year courses include 8,000 hours on-the-job training and 576 hours of related classroom instructions. Classes are held after hours on the employees' time but in classrooms on company property. Teachers are journeymen, engineers and foremen. These courses are in the electrical trade and cover five general job classifications: lineman, sub-station man, meter

man, power plant operator and power plant maintenance man. Outstanding trainees are selected and honored each year from the line and plant programs in each Division.

#### Apprentice Program

The apprentice program was inaugurated in 1953, and there are now 206 apprentices in the schools, attended by a total of 355 students, of whom 129 are linemen and 206 plant men.

Apprentices are selected from company employees engaged to work as either groundmen in the line department or as helpers in the plant. They work at these jobs from a minimum of six months to two years, until an opening develops in the apprenticeship program since turnover is small. At such time they receive credit for as much as one year, if their work progression warrants.

Apprentices must be between 18 and 28 years of age and hold high school diplomas or their equivalent. Southwestern has 1,850 employees and the ratio of ap-

prentices to journeymen is one to three. A first-year apprentice is paid 73% of the journeyman wage, progressing to approximately 88% during the fourth year.

On completing prescribed courses in the Vocational Schools, participants are given examinations. This, plus their training histories, determines whether they will receive certificates from the company for a year's completed work, a company certificate for a full four-year course, or an apprentice completion certificate from the U. S. Department of Labor, Bureau of Apprenticeship and Training, for a four-year apprenticeship. The apprentice program is registered with the Bureau and assisting the company is Frank A. Youngblood, Amarillo Field Representative.

First year lineman training includes: mathematics (fractions, percentages, measurements, ratio and proportion, powers and roots, formulas and angles, lines and figures.)

The second year is devoted to fundamentals of electricity with such subjects as customer relations, definitions and terms, magnets and magnetism, d-c circuits, alternating current, and production of electricity.

Electric utility systems are covered in the third year with such subjects as transformers, transmission and distribution, transformer protection, resistance, measuring instruments and street lighting.

The fourth year is given over to advanced electric utility systems with the following subjects: load characteristics, a-c currents, circuit calculation, protective equipment, construction and operation and system design economy.

The four-year power plant training includes progressive instruction in mathematics, fundamentals of electricity, electrical equipment, controls, water treating, turbines and generators, pumps and fans, boilers and accessories and miscellaneous equipment.

### Journeymen Participate

Journeymen are enthusiastic about the Vocational Schools since they are urged to attend and increase their skills. They recognize that all training is directed to what craftsmen need to know to do their work better. They are willing to instruct apprentices and other beginners, realizing these individuals will never advance to journeyman status without their skilled instruction. The training program creates no apprehension on the part of journeymen as to their job security.

### Supervisory Training

Supervisory training at Southwestern begins with the foreman and extends to the executive level. It is a one-year course consisting of twenty conferences on company time. Its objectives are to develop the leadership ability of supervisory management; to emphasize the many ways in which skillful, enthusiastic supervision guarantees the company's success; to discuss

Plant Skill Improvement Class receives theory at the company's East Plant in Amarillo. Clifford Morrow, instructor, also serves on the curriculum committee which edits text material and lesson plans for the entire program.



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# YARWAY

principles of supervision and their application to company aims and policies; to foster pride in the position of supervisor; and to gather, through the conference method, the ideas and suggestions of successful supervisors.

Subjects include Supervisor's Responsibilities; The Supervisor and Self Development; Managing Your People; Leadership in Action, including Principles of Leadership and Promoting Job Satisfaction and Morale; The Supervisor and Human Relations, including Principles of Human Relations and Understanding People in Work Relationships, and Mental Processes; Getting Your Group to Cooperate; The Organization for Which We Work, covering the company's physical and financial structure; Modern Personnel Practices; Safety; Training; Maintaining the Working Force; and Proper and Effective Use of Tools and Equipment.

#### **Customer Relations**

Another facet to Southwestern's training is a Customer Relations Training Program consisting of a two-hour conference each week over a twenty-week period. These are given on company time and train customer contact people in the policies and techniques governing the handling of actual contact problems. They also provide the customer contact employee with a better background of the company's economic position; a better understanding of human nature and how it can be influenced to make friends of customers.

#### **Estimator School**

The company also sponsors a 16-week full-time Engineering Estimator School which turns out technicians who can serve as professional engineers' right hand men in both the office and field. The training takes 638 hours including engineering and non-technical subjects. These trained persons relieve the engineers of many tasks such as driving hundreds of miles to collect load study data. The estimator also gathers facts for legal right-of-way descriptions for short pole extensions; makes preliminary job surveys; prepare sketches; estimates costs; and does

**"We consider our training program an investment that has more than paid off. The skilled worker produces far more than the unskilled, and the employee trained with the company, tends to stay with the company."**

much of the paper work and routine reporting.

Men selected for the course come from within the company and represent a wide range of skills including journeymen or apprentice linemen, groundmen, warehousemen, draftsmen, or engineering estimators, who previously did not receive formal training. Applicants are accepted on the basis of aptitude tests, interviews and supervisory recommendations.

Instructors are company engineers carefully selected on the basis of education, teaching experience and knowledge of the subject. Engineering subjects are usually taught by instructors from the company plant and linemen vocational schools. Managers and department heads teach non-technical courses, such as rates and budgets, customer relations and accounting in accord with Federal Power Commission account numbers.

Classroom and cafeteria facilities are provided by Amarillo College through the cooperation of the Texas Education Agency. Since the course meets the requirements of the college's Community Service Department, each student receives a completion certificate from the college as well as from the company.

The curriculum covers basic principles of mathematics, fundamentals of electricity, principles of electric utility systems and advanced principles of electric utility systems. There is a course in drafting. Construction standards include drawings, assemblies and material identification and selection, and metering. Accounting procedures comprise FPC system account numbers, improvement requisitions and other company forms and records. Under miscellaneous subjects are customer re-

lations training, slide rule, national electric safety code, rates and budgets, relays and switching procedures, and surveying and mapping. Supervised study periods are provided.

#### **Advanced Courses**

Southwestern is also providing for advanced courses for graduates from the vocational schools. These include such subjects as reheat turbines, relays, instrumentation and water treatment. There are also from 1-3 day courses periodically for secretarial personnel.

To encourage their employees to learn more, the company refunds half of the tuition fees for extension, evening school and correspondence courses on satisfactory completion of such courses. Teacher training, in five ten-hour courses is provided by the University of Texas.

#### **Elements in Success**

Curricula committee men from the various Divisions of the company prepare text materials in many fields. These are submitted to the System Training Supervisor, Mr. E. W. Love, who in turn, submits them to a system curricula committee for a last checking. Finally, Mr. Love organizes the material and edits it for readability after which it is approved by management, printed and distributed. Texts are complete with explanatory drawings and illustrations.

Mr. Love is thoroughly familiar with Southwestern and has been with the Company since 1959. He is a graduate of the University of Kansas School of Business, majoring in Personnel Management. He went with the company as a Personnel and Safety Supervisor in the field after which he was in both the Sales Department and Personnel before becoming System Training Supervisor. Dana Persons was recently employed as Training Coordinator to keep manuals for the line schools up-to-date.

Convinced of the importance of training to meet the expanding needs in the area, the company welcomes employees from other industries to attend its training sessions.



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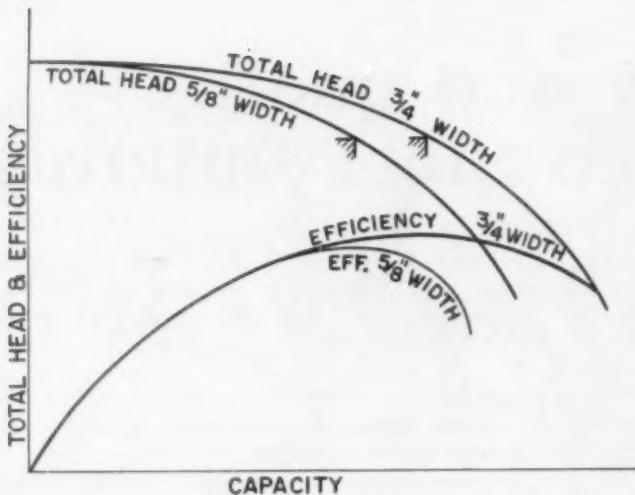
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# Centrifugal Pump

## Clinic

**QUESTIONS & ANSWERS** — Conducted for SPI readers by Igor J. Karassik, consulting engineer and manager of planning; and W. C. Krutzsch, assistant chief engineer of the Harrison Division, Worthington Corporation.



### Question . . .

I HAVE read somewhere that the capacity of a centrifugal pump varies approximately with the width of the impeller. That is, if the impeller is  $\frac{3}{4}$ " wide and the head-capacity is like that shown on the attached sketch, then if the impeller were made only  $\frac{5}{8}$ " wide on the OD, the head curve would fall off in the ratio of  $\frac{5}{8}$  to  $\frac{3}{4}$ , or of 5/16.

Now what I would like to know: if the efficiency curve for the  $\frac{3}{4}$ " wide impeller is as indicated on the sketch, what will it be for the  $\frac{5}{8}$ " wide impeller? Will the whole efficiency curve shift to the left or will it remain the same as for the  $\frac{3}{4}$ " wide impeller, but fall off in the higher capacity range as I have indicated? (See illustration.)

### Answer . . .

**THE PROBLEM** involved here is somewhat complex and it is difficult to make general rules that would apply to any and all designs. While theoretically the head-capacity curve would fall off in the ratio of the impeller widths as you indicate, this would be true only within a narrow range of widths. Should too narrow an impeller be used in a given pump casing, there could take place an excessive amount of turbulence and shock losses, which would not only tend to reduce the capacity of the pump but also may react unfavorably on the head generated by the pump. Therefore, the head at shut-off or zero delivery may be less than that produced by the full width impeller. If the reduction in width is not excessive, however, the head at shut-off will be approximately the same, as it can be controlled within certain limits by proper design of vane exit angles and other design factors.

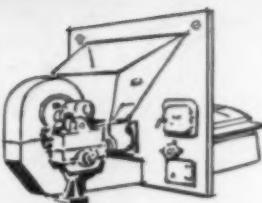
The best efficiency point of a narrow impeller will move to a lower capacity approximately in the same proportion as the head-capacity curve, provided that other portions of the impeller are prop-

# FOR ANY COAL BURNING EQUIPMENT

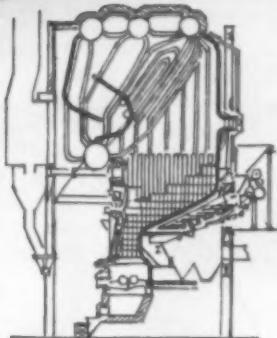
... there's a type of Fuel Satisfaction \*  
to do the job better, more efficiently,  
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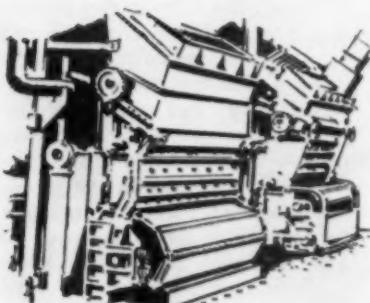
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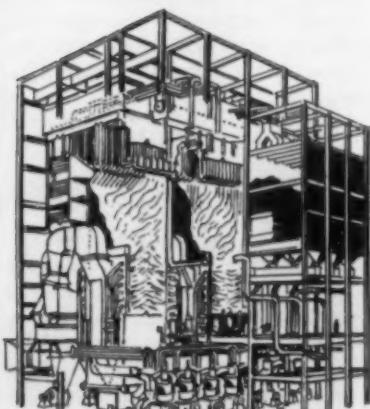
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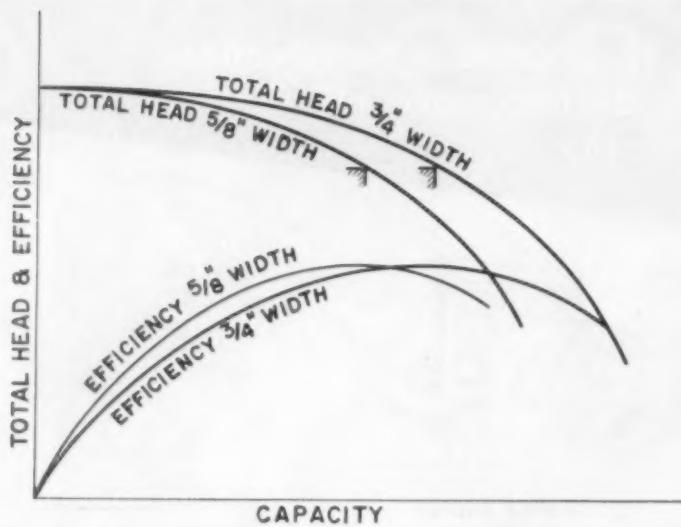
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erly adjusted in design. In other words, it is also necessary to reduce the inlet area between the vanes. Another way of expressing this is that a factor less than 1.0 is applied to the entire impeller, after which the impeller is extended to its original diameter. The casing design may also affect the behavior of the impellers. If, for instance, the wider impeller is being severely throttled in the casing itself, the narrow one may show very little change in performance.

Except for very small changes in width, the best efficiency will be decreased somewhat by narrowing the impeller. This decrease is caused by three separate factors:

- 1) Increasing turbulence and shock losses.
- 2) Increase in the proportion between the disk horsepower and the useful water horsepower.
- 3) Increase in the proportion between the leakage and mechanical losses and the useful water horsepower.

The disk horsepower is that power required to drag the impeller through the liquid surrounding it and is caused by the friction of the liquid against the shrouds (or walls) of the impeller. This loss will remain essentially constant, regardless of the width of the impeller, assuming that the speed and the impeller diameter

remain constant. However, the decrease in the pump capacity for any given total head will decrease the net output of the pump; and, therefore, the proportion of the losses to the net output would increase, lowering the pump efficiency.

In the same manner, with the same differential pressure across the wearing rings, the leakage losses remain constant. So do the mechanical losses in the bearings and at the stuffing boxes. The overall effect can best be visualized by examining the formula for pump efficiency.

$$e = \frac{\text{Water hp}}{\text{Water hp} + \text{Hydraulic Losses} + \text{Disk hp} + \text{Leakage Losses} + \text{Mechanical Losses}}$$

If we reduce the water horsepower but keep the disk hp, leakage losses and mechanical losses constant, the efficiency will obviously be reduced.

The aforementioned should not be interpreted to mean that narrow impellers should not, or are not, used. As a matter of fact, in many cases a standard line of pumps will include two groups of impellers; one (called the 100% impellers) is designed to fully utilize the pump casings and the second group (called the 80% impellers, for instance) used to move the best efficiency point to a lower capacity. In this manner, a greater coverage is obtained from a line of pumps.

Assuming that the narrower impeller has been designed with proper attention to the necessary details, the performance of the pump will be similar to that illustrated.

### Better Control for Cut-off Saw

**THIS IDEA** deals with the conventional ceramics cut-off saw using the abrasive wheel as the cutting medium. Heretofore, it has always been the practice to mount the stop-start switch either on the base of the machine itself or on the nearby wall or building column. Either spot left

something to be desired since the operator had to stoop to reach the switch in the first instance, or walk over to the wall in the second case. So, in the event of accident, instant accessibility was not at hand.

With a little collaboration on the part of the millwright who

furnished the mounting bracket for the combination stop-start station and overload protection device we mounted the control right out on the saw's swing frame. Because of the hinged joint feature of the swing frame the new plastic-covered, flexible metal conduit was used. The operator is happy with his new installation.

By PAUL ZIEMKE, Clinton, Tennessee.

# INDUSTRIAL TRUCKS — Got Hydraulic System Troubles?

**WHEN** was the last time something went wrong with the hydraulic system of one of your industrial trucks?

In many cases, a minor operating defect in this system can be quickly and simply corrected, if maintenance personnel know what to look for.

Because of this lack of basic understanding by many people, the following information is offered by John Draxler, assistant chief engineer and service manager of the Elwell-Parker Electric Company, Cleveland.

It is part of a complete check list on this subject which is available from the company without charge.

## Problem No. 1: Low working pressure.

Look for: Worn pump or pump motor, low voltage, loose electrical connection or hose line restriction.

## Problem No. 2: No motion, slow or jerky motion of the elevator or the mast when tilted.

Look for: Weak or broken relief valve, scored relief plunger or seat, worn or broken seal (O-Ring), dirt or foreign matter, a plunger which does not open all the way, or a sticking plunger.

In addition: Check air in lines, worn packing, packing cups or broken packing cup back-up rings.

Remedies: Replace weak or broken parts; lap in relief valve plunger seat with light grinding compound; replace seal, flush entire system; adjust control leakage for equal plunger strokes and replace return spring if broken; remove scores on plunger with medium grade emery cloth dipped in oil; replace spring.

In addition: Bleed cylinder by relieving bleeder screw or breaking line coupling screw; with oil

at working pressure; or replace worn parts.

## Problem No. 3: Load on cylinder will not hold.

Look for: Oil bypassing the valve plunger.

Remedy: This condition can only be corrected by the truck manufacturer by rehoning the plunger bore and replacing the plunger with an oversize valve. Note: Be sure to check the cylinder, since in some cases, wear in the cylinder or packing will allow load to drop.

## Problem No. 4: Seeping packing gland.

Look for: Worn or damaged packing assembly, damaged auxiliary O-Rings.

Remedy: Adjust or replace packing assembly; replace auxiliary O-Rings.

## Problem No. 5: Tilt speed of mast is normal on backward movement, but sluggish on forward movement.

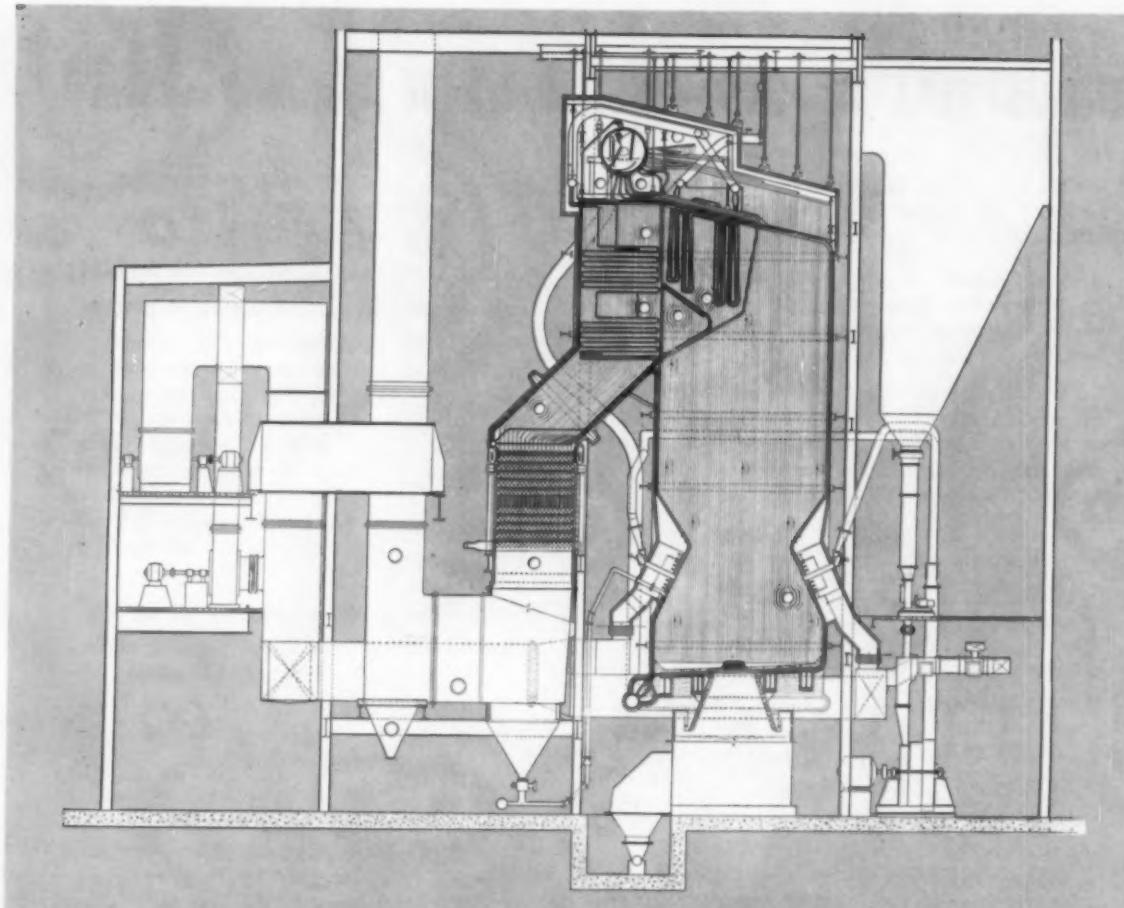
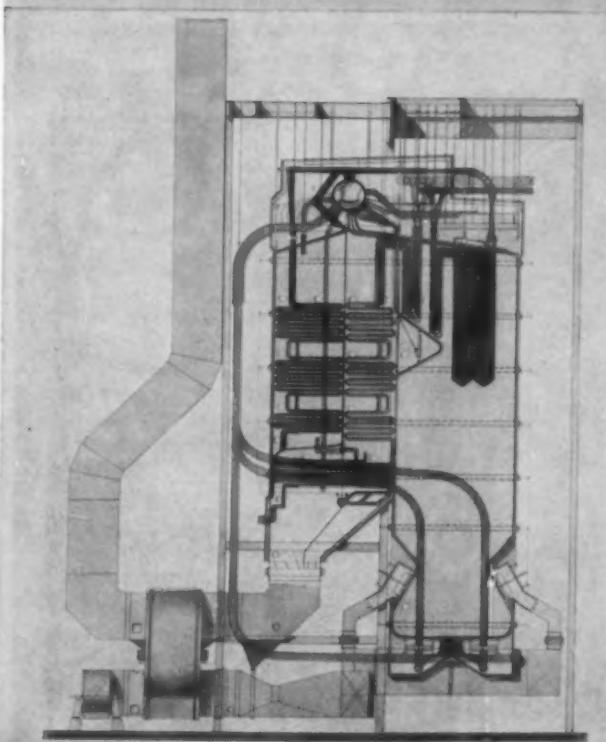
Look for: Foreign matter or obstruction at tilt check needle.

Remedy: Back-off needle valve by relieving lock nut; operate tilt; tilt motion both directions; reset check for desired tilt motion; lock jam nut.

## Problem No. 6: Holding pressure of attachments drops.

Look for: Foreign matter lodged on valve seat of check valve, worn or pitted plunger check valve seat, weak pressure spring of check valve, worn packings of cylinder, also first six factors listed in Problem No. 2.

Remedies: Flush out check valve; lap in seat if badly pitted or replace check valve; replace pressure spring; replace worn packings; also first six factors listed in remedies portion of Problem No. 2.



#### A Progressive Chemical Company

One 400,000 lbs/hr Turbo Furnace Boiler: 830 F — 1250 psig. Unit is fired by pulverized coal from three Riley Pulverizers. A second Turbo Furnace Boiler of 600,000 lbs/hr has been purchased for a second plant at this location.

#### A Louisiana Public Utility

One 1,550,000 lbs/hr Turbo Furnace Boiler; 1005 F superheat, reheat — 2175 psig. This unit has a furnace 55 feet wide with no water cooled platens or dividing walls. Fired by natural gas. Can be converted to coal quickly and at low cost.

#### A Prominent Manufacturer of Electrical and Electronic Equipment

One 150,000 lbs/hr Boiler: 835 F — 900 psig; Fired by pulverized coal. One Duplex Riley Pulverizer.

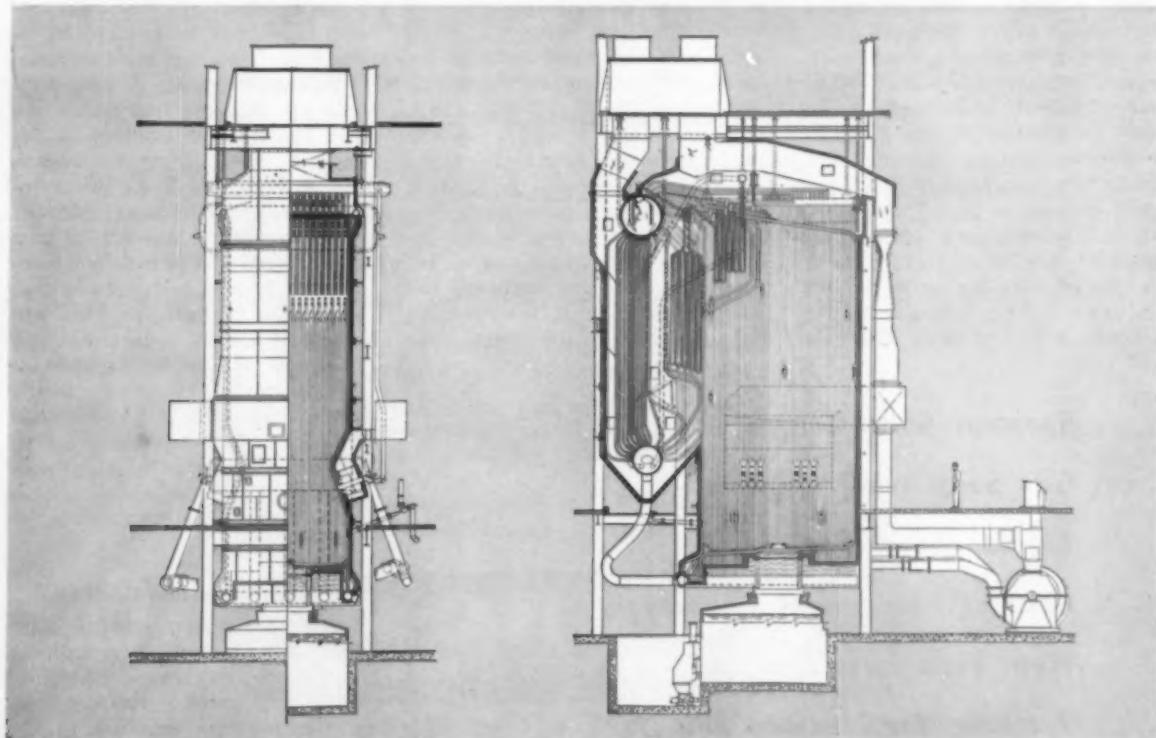
*For the full operating facts of Riley Turbo Furnace Boilers consult your Riley representative.*

# These Three Companies Selected The **RILEY TURBO FURNACE** Because Of These Outstanding Performance Characteristics

- Eliminates the flyash disposal problem
- Clean furnace walls eliminate necessity of wall deslagging equipment
- High operating efficiency — minimum carbon loss — low excess air
- Uniform distribution of furnace gases across full width of the superheater with minimum variation in metal skin temperatures from side to side
- Maximum utilization of waterwall surface
- Economical and quick conversion from gas and oil firing to coal
- Because of performance characteristics, the Riley Turbo Furnace can be operated at higher heat releases: The size of the unit is reduced thus reducing building costs and permitting higher capacity within a given space
- A wide furnace is possible without need for dividing walls
- One level firing reduces expense for walk-way systems
- Provides ease of observation and operation

FOR TURBO FURNACE DETAILS — WRITE RILEY STOKER CORPORATION, WORCESTER, MASSACHUSETTS

*A survey of your plant by a qualified consulting engineer could show ways of making surprising savings in your power costs.*



# Nuclear Progress

## at Lynchburg

By JOHN F. LEE  
SPI Consultant on Atomics and  
Professor of Mechanical Engineering,  
North Carolina State College

**THE SOUTH** is making valuable contributions to developments in the industrial use of atomic energy. In this article we shall pay particular attention to progress at the Babcock and Wilcox Company plant in Lynchburg, Virginia.

### Spectral Shift Control

For nearly two years, the Babcock and Wilcox Atomic Energy Division has been working on an advanced control method for water-moderated and cooled reactors. This method, which utilizes a mixture of heavy and light water for the pressurized coolant-moderator, represents a logical extension of activity in connection with the Consolidated Edison Thorium Converter Reactor and the Nuclear Merchant Ship (N.S. Savannah) reactor.

To achieve a core with a long lifetime, the original core must be loaded with a quantity of fuel in excess of that basically needed to form a critical mass. The "ex-

cess reactivity" must be carefully controlled, and made available gradually to replace the material being "burned up."

In this new method of control, instead of using less efficient, more expensive control rods to hold down the excess reactivity, the proportions of heavy and light water in the coolant-moderator are varied. The initial high concentration of heavy water (about 80%) requires more fissionable material for criticality than does the lower concentration (about 30%) used near the end of the core life. Consequently, a large amount of fissionable material can be safely loaded into the core at the outset.

Then, during operation, as the fuel "burns up," new fuel is made available effectively, by diluting the heavy water, since lower concentrations of heavy water require less fissionable material for criticality. In this manner, the energy spectrum of the neutrons is shifted, thereby controlling more

reactivity over the lifetime of the reactor core. From this principle, the "Spectral Shift Controlled" Reactor gets its name.

The Spectral Shift Controlled Reactor offers the possibility of markedly reducing nuclear fuel costs by extending the reactivity life of a core to as much as 40,000 megawatt days per ton of fertile material, more than twice that expected from a conventional Pressurized Water Reactor. Since this method of control also increases the average conversion ratio by about 0.2, fuel consumption costs may be reduced by as much as 1 mil per kilowatt-hour.

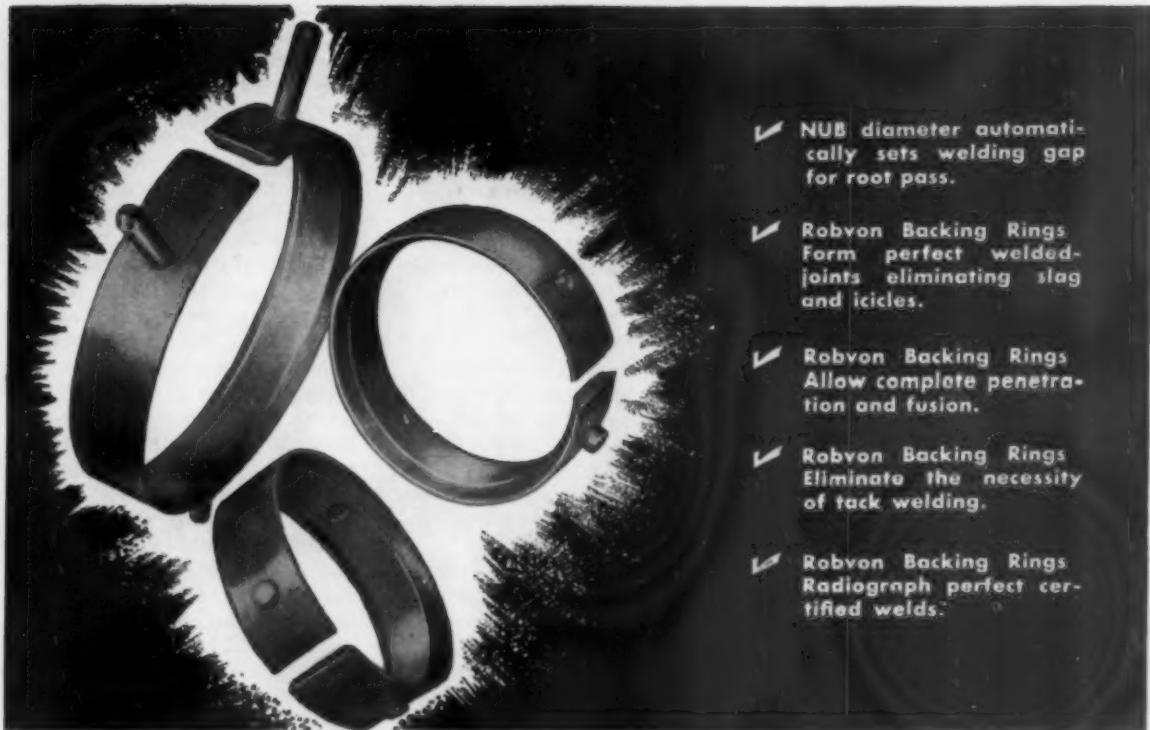
The reactor design permits flexibility in choosing fuel cycles and fuel loading. For example, either thorium or U-238 can be used as fertile materials in either stainless steel or zirconium cladding.

Additionally, since few, if any, control rods will be required, loading the fuel in non-uniform patterns will be possible. This will result in a more even power distribution and a higher average output can be extracted from a given core size. It is estimated that up to 75% more heat can be extracted through the use of non-uniform zone loading techniques made possible by the new control method.

- ... **Spectral Shift Control**
- ... **Gas Suspension Coolant**
- ... **Liquid Metal Fuel**
- ... **Critical Experiment Laboratory**
- ... **New Type Fuel Element**
- ... **Training for Nuclear Ship**

### Gas Suspension Coolant

Recent research at Lynchburg has shown that the heat transfer and heat transport properties of gases are greatly improved by suspending fine particles in the



✓ NUB diameter automatically sets welding gap for root pass.

✓ Robvon Backing Rings Form perfect welded-joints eliminating slag and icicles.

✓ Robvon Backing Rings Allow complete penetration and fusion.

✓ Robvon Backing Rings Eliminate the necessity of tack welding.

✓ Robvon Backing Rings Radiograph perfect certified welds.

## ROBVON BACKING RINGS

APPROVED FOR WELDED PIPE, VALVES,  
AND FITTING JOINTS

Available in carbon steel, wrought iron, chrome alloys  
stainless steel, aluminum and copper

### TYPE CCC

Designed for quick easy alignment of pipe where the variation in inside diameters is relatively great. Chamfered NUBS allow close tolerance fit-up and CLEAN STRIKE OFF. The ROBVON NUB automatically sets root gap. ROBVON rings are beveled to assure non-restricted fluid flow.

### TYPE CC

Designed to allow quick easy alignment of pipe where the inside diameters are slightly out of round. The welder has the choice of "STRIKING OFF" the NUBS or leaving them intact to be melted into the weld mass of the first root pass.

### TYPE C

Designed for precise close tolerance fit-up. Type "C" NUBS automatically sets root gap. The NUBS melt with the metal to give complete penetration and fusion.

Robvon also manufactures machined rings to customer's specifications  
All fabricated solid machined rings x-rayed. Write for full information

**ROBVON**  
BACKING RING COMPANY

675 GARDEN STREET

ELIZABETH, NEW JERSEY

gases. The result is a low pressure, low cost reactor coolant which avoids many of the major design problems encountered with liquid coolants.

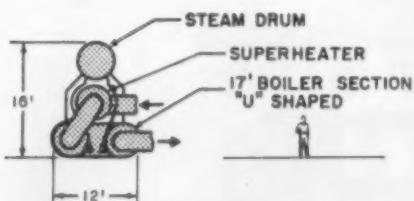
Preliminary studies indicate that this coolant will make possible the development of nuclear power plants which combine a high-temperature steam cycle with other factors important to the achievement of competitive nuclear power.

A gas-suspension reactor coolant will consist of fine particles (less than 5 microns) of graphite or other solids suspended in carbon dioxide, nitrogen, helium, or argon. The density of these mixtures will vary between 5 and 15 lb/cu ft at an operating pressure of 100 psig or less.

The work has been largely with graphite- $\text{CO}_2$  mixtures with densities up to 8 lb/ft<sup>3</sup>, circulated in a closed loop at 35 psig, 300 F, and 40 ft/sec. Loop operation has been very satisfactory with no evidence of erosion or significant particle adherence to surfaces. Heat transfer rate increased by a factor of eight over that for  $\text{CO}_2$  at the same pressure, temperature, and velocity. In addition, the heat transported around the loop increased by a factor of 21.

The effect of the improved coolant characteristics is dramatically illustrated in Figure 1, which shows a comparison of the size of a Calder Hall boiler and superheater unit and the size of a gas-suspension unit of the same capacity (46.5 mw thermal). The remarkable size reduction anticipated for the gas-suspension unit will be due mainly to improved heat transfer and heat transport which will allow a marked reduction of total cooling surface.

The improved heat capacity of



Boiler size comparison — Calder Hall unit vs improved gas-suspension design.

the coolant will permit an increase in the reactor inlet temperature to 487 F (as compared to the 275 F inlet for Calder Hall) and eliminate the need for economizers and the two-pressure boiler system. Moreover, the possibility of extracting a higher temperature steam will result in a higher feed-water temperature and a significant improvement in steam cycle efficiency.

### Liquid Metal

Another program at Lynchburg, designed to investigate the use of uranium dispersed in "liquid metal" serving as a combined nuclear reactor fuel and coolant, has reached an advanced stage with the beginning of criticality experiments.

A test unit, or critical assembly, is being operated for the Atomic Energy Commission at the Critical Experimental Laboratory to help determine the nuclear characteristics of a Liquid Metal Fuel Reactor system. Although the critical assembly does not incorporate a liquid metal fuel it acts as an analog. Composed of a "pile" of graphite and bismuth bars of various shapes and sizes, the critical assembly is an octagon 8 ft high

and more than 9 ft across.

For its fuel, the assembly utilizes enriched uranium-aluminum alloy strips fastened to bismuth bars with plastic adhesives. Making up the core are subassemblies consisting essentially of these bars held in graphite channels. The core arrangement permits changes to be made in one subassembly without disturbing others.

The Liquid Metal Fuel Reactor concept represents a striking departure from the conventional reactor in its proposal that the fuel, highly enriched uranium metal in molten bismuth, be circulated through the reactor system. In operation, the uranium-bismuth liquid fuel would cycle through a graphite core and continue through external heat exchangers and back to the reactor. In most conventional reactors, the coolant, which may also be the moderator, circulates through fixed fuel elements.

### Critical Experiment Laboratory

One of the nuclear industry's most serious roadblocks is its dependence on theoretical calculations to determine reactor behavior under actual operating conditions. The Lynchburg facility expects to place this phase of power reactor technology on firmer ground through the use of a combined research and test reactor which Babcock & Wilcox began operating at its Critical Experiment Laboratory.

The new unit will provide industry with a means of determining accurately how reactor cores will behave at operating temperatures. In the past reactor behavior for these conditions has been determined by calculations based on experiments at room temperatures. Now, with this new "hot exponential" facility, the first of its kind in the country, reactor characteristics at high temperatures can be measured.

The exponential facility is essentially a pressure vessel, 3 ft in inside diameter by 9 ft long. It is designed to duplicate reactor operating temperature and pressure conditions. A hydraulically-operated, quick-opening door at the outer end permits rapid and

(Continued on Page 66)

# Announcing ...

BOILER ENGINEERING & SUPPLY CO.



## Shown for the first time at the ASHAE Show in Philadelphia

Here is a completely new approach to Hot Water Boiler design. Continental gives you all the features you want for efficiency . . . for economy . . . for low maintenance costs. Check these performance advantages:

★ In the history of package boilers, there has never been a single case of damage due to "thermal shock" with the Continental Boiler.

★ Operates at high or low water differential temperatures . . . at high or low rates of water circulation . . . responds rapidly to temperature controls.

★ May be used for either direct or reverse flow.

★ Has internal expansion space to cushion the dynamic surge of circulators and eliminate entrapped air from system water.

For complete engineering data on the new Continental Hot Water Automatic Boiler, see the Continental representative or write for Bulletin BE-200.

**BOILER ENGINEERING & SUPPLY CO., INC.**  
Phoenixville, Pa.

NEW\* from



# Westinghouse...the only

# complete maintenance inspection and engineering service on a scheduled basis



Weekly, monthly or yearly—whatever your needs—this Westinghouse engineer will check and test your electrical equipment under contract

You can now have an experienced Westinghouse Maintenance Engineer—with a fully equipped service truck—in your plant, working for you. Behind him he has the complete resources, research, engineering, man power and facilities of Westinghouse. Yet your cost is less than the relative cost of lubricating your car—less than 1 percent of the value of your equipment.

These scheduled inspection recommendations and adjustments can prevent equipment failure, reduce outage and downtime to a minimum. Maintenance Engineering Service, on a yearly contract basis, is designed to inspect and test all your electrical equipment.

\*Offered in Westinghouse Southeastern Region Only

YOU CAN BE SURE...IF IT'S  
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For complete information, send this coupon to Westinghouse Electric Corporation, 1299 Northside Drive, N.W., P.O. Box 4808, Atlanta 2, Georgia. What electrical equipment do you have?

J-95204-R

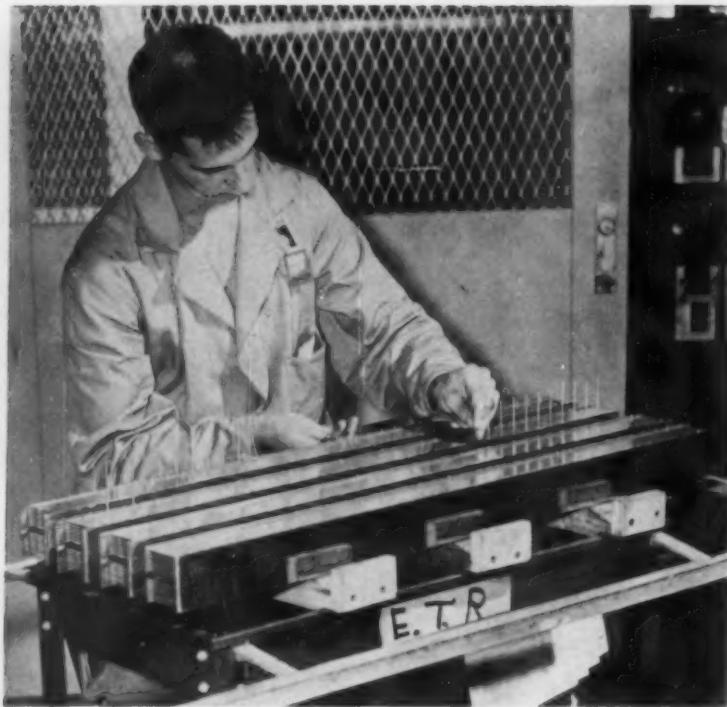
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<input type="checkbox"/> transformers	<input type="checkbox"/> substations
<input type="checkbox"/> switchgear	<input type="checkbox"/> primary and secondary distribution systems

Name \_\_\_\_\_ Title \_\_\_\_\_

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City \_\_\_\_\_ State \_\_\_\_\_



frequent access to the test assemblies inside the vessel both for prompt removal of testing equipment and rearrangement of core assemblies.

During test operations a sub-critical assembly of fuel rods is placed in the vessel, together with wires which record the neutron distribution along the axis of the fuel rods. The vessel is then filled with water. An external heater and pressurizer produce operating conditions up to 500 F and 720 psi. The adjacent reactor serves as a neutron source for the test assembly. A boral gate minimizes reactivity coupling between the reactor and the assembly under test.

After the wires have been exposed to neutron bombardment within the assembly, they are removed and their radioactivity is measured to determine the neutron flux distribution throughout the assembly. The neutron distribution is known to fall off exponentially along the axis of the assembly, giving rise to the name "exponential facility."

Believed to be the first commercial installation of its kind in the nuclear industry, a Teleflex wire activation system, based on

a design by the Knolls Atomic Power Laboratory, is a vital part of the exponential facility. Neutron flux measurements at high temperatures and pressures are now possible without the requirement for first lowering the temperature or opening the exponential facility door to remove test material.

The new reactor and hot exponential facility unit is housed in a newly constructed bay of the Critical Experiment Laboratory at Lynchburg, the first such laboratory to be licensed by the Atomic Energy Commission and built entirely with private funds.

#### New Fuel Element

A new type of nuclear fuel element, assembled with aluminum "pins" rather than by brazing or soldering, has made possible for the first time full-power operation of a test reactor important to America's peacetime atomic energy development program.

The Lynchburg facility developed the aluminum pin technique of fastening fuel element side plates to fuel plates in an effort to provide a fuel element which was more corrosion-resistant, stronger, and dimensionally stable.

The aluminum pinning technique for fastening fuel element side plates to fuel plates provides a fuel element which is more corrosion-resistant, stronger, and dimensionally stable.

An employee of the Babcock & Wilcox Company's Nuclear Facilities Plant in Lynchburg, Va., is shown inserting aluminum pins in the fuel elements used in the Experimental Test Reactor at Arco, Idaho.

Following successful tests with a "dummy" pinned-type fuel element, a Babcock & Wilcox contract with Phillips Petroleum Company was modified to specify ETR fuel elements and control rod elements based on the new design. The Engineering Test Reactor attained its full power of 175 mw for the first time last April with the new core. After three weeks of successful operations, the fuel elements were removed for examination and found to be mechanically unaffected.

#### Training for Savannah

The training program for the reactor operating crew of the world's first nuclear-powered merchant vessel, the N.S. Savannah, is being conducted by Babcock & Wilcox at Lynchburg, Virginia and is expected to last approximately 15 months. Its purposes are to provide a crew of skilled reactor operating engineers for the Savannah, and to train certain other personnel, including Coast Guard Officers and Merchant Marine Academy Instructors.

Babcock & Wilcox, which is designing and fabricating the complete reactor system for the Savannah, was selected to give the program by the Atomic Energy Commission and the Maritime Administration from among nine firms and institutions submitting proposals. Some of the factors considered in making the selection were the proposed course of study, background of the Company's staff and the Company's training program experience.



Control room at Shippingport Atomic Power Station. Bailey Instruments for the primary system and Bailey Instruments and Controls for the steam system are located on this control panel.

## Bailey pioneers the control of...

## ATOMIC STEAM POWER PLANTS

This control room is the center of operations for the world's first full-scale atomic, electric power plant devoted exclusively to civilian use—the Shippingport Station, jointly owned by Duquesne Light Company and the Atomic Energy Commission.

Here, as well as on the atomic-powered submarines, are Bailey Instruments and Controls performing dependably hour after hour, month after month.

In conventional power plants, too, Bailey Meters and Controls are standard equipment. Bailey is the choice of virtually all the most efficient plants on the Federal Power Commission's heat rate report. Here's why:

### 1. A Complete Line of Equipment

You can be sure a Bailey Engineer will offer the right combination of equipment to fit your needs. Bailey manufactures a complete line of standard compatible

pneumatic and electric metering and control equipment that has proved itself. Thousands of successful installations involving problems in measurement, combustion and automatic control are your assurance of the best possible system.

### 2. Experience

Bailey engineers have been making steam plants work efficiently for more than forty years. Veteran engineer and young engineer alike, the men who represent Bailey, are storehouses of knowledge on measurement and control. They are up-to-the-minute on the latest developments that can be applied to your problem.

### 3. Sales and Service Convenient to You

There's a Bailey District Office or Resident Engineer close to you. Check your phone book for expert engineering counsel on your steam plant control problems.

A136-1

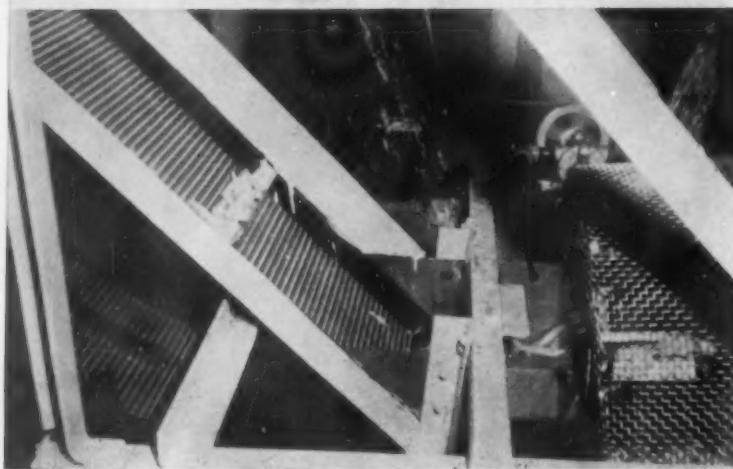
*Instruments and controls for power and process*

# BAILEY METER COMPANY

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In Canada—Bailey Meter Company Limited, Montreal





## Foam Stopped

**FOAM** is trouble. Foam is money lost. Foam costs capacity, production time, efficiency and safety of operation . . . it can even cause a faulty product. But you can kill foam bills, and easily, regardless of the nature of your operation . . . be it paper manufacturing, textile processing, metalworking, chemicals, or any other.

For example, here's the experience of a food processor, Ready Quick Food Company of Colonial Heights, Va. In preparing potatoes for restaurants to french-fry, Ready Quick production men had these foaming problems:

1 — Foam caused a half-hour delay in potato washing every morning.

2 — Foam covered sliced po-

tatoes; made them cling to the conveyor belt beyond the drop-off point. 200 to 300 pounds each day were lost on the floor.

3 — Foam clinging to potatoes later liquefied . . . a nuisance to the restaurants.

All three troubles ended when Ready Quick began using an ounce a day of Dow Corning Antifoam AF Emulsion. Now there's no more delay, and 96% fewer lost potatoes. The accompanying photographs show how foam was eliminated.

This history is typical of the results you can get with Dow Corning silicone defoamers, whatever your industry, whatever your process problem. Investigate silicones for either aqueous or non-aqueous systems!

## Router Speeds Construction

**TRIMMING** problems encountered in the manufacture of pleasure boats have been eliminated by Moulded Products, Inc., makers of Whirlwind Boats, Cockeysville, Maryland. With the use of a Black & Decker router and several special fixtures designed for the router, this work has been both accelerated and improved in quality. According to Charles Wingo, production partner of Moulded Products, time savings of 75 to 80% have been realized on sizing and slotting hatch covers and trimming coamings and various deck pieces.

The base of a Black & Decker 1 hp router was fitted with a special guide plate that could be set on angles both above and below center. This enabled the router to trim smoothly on a set angle.

In the photo, the deck is being trimmed flush with the dash. Formerly the job was done with a hand spoke-shave and then finished with a sander. Besides the care required to make the trim hold an even angle all the way across, there was danger of marring the dashboard if the tools slipped in any way. With the router and its fixture, the job is done in a single clean sweep, taking approximately one minute. Formerly, the same job took nearly 15 minutes. Most important, however, according to Mr. Wingo, is the added quality obtained from the new method.



## Southern News Briefs — Continued from Page 16

### Elec. Maintenance on Contract Basis

Westinghouse Electric Corp. has been developing a new and unusual engineering service in the Southeast for the past 3 years — the Maintenance Inspection Contract.

The idea of a major national electrical manufacturer offering maintenance service on a contract basis began as a natural outgrowth of needs in the Charlotte, N. C. area. There, many industrial plants, municipalities and REAs were faced with the problem of maintaining vast amounts of electrical equipment, which grew more complex each year, without adequate facilities or personnel. The result was scheduled maintenance service — on a contract basis.

The Westinghouse Maintenance Contract provides a flexible program of high quality maintenance service on a scheduled basis, covered by a formal agreement between Westinghouse and the customer.

These contracts are developed primarily for customers who do not have adequate maintenance facilities or personnel, or for those who wish to assign their personnel to other activities and handle this responsibility on a contract basis. The contracts cover inspection and/or maintenance on a semi-annual or annual basis.

The Westinghouse engineers who service these contracts are specially selected for work in this important new program. They are the best available engineers with the longest experience records. Fully equipped mobile maintenance trucks have been equipped by Westinghouse to operate in the region.

This Contract Maintenance Service is now available to all who desire it in the Southeast.

### Yale & Towne — Fla.

Neff Machinery, Inc., with sales and service facilities in Miami and West Palm Beach, has been named exclusive franchise representative for Yale & Towne Mfg. Co. industrial lift trucks and tractor shovels in Southern Florida.

President of the company is P. H. Neff. N. A. Crane is general sales manager and Robert Moore will be in charge of materials handling equipment sales.

### Riley Stoker — N. C.

Riley Stoker Corp. of Worcester, Mass. has announced the opening of its new district sales office at 309 Cole Building, Charlotte 4, N. C.

R. C. Meleney is District Manager of the office which will act as an outlet for complete steam generating and fuel burning equipment.

### A. M. Byers — Tex.

Robert D. James has been assigned as a field service engineer in A. M. Byers Company's Houston Division office.

Before coming to Byers, Mr. James was employed by Allis-Chalmers Manufacturing Company and the General Cable Corporation.

A. M. Byers Company, Pittsburgh, is the world's largest manufacturer of 4-D wrought iron products, produces Amballoy electric furnace steels, and markets PVC plastic pipe, sheet and rod.

### Cooper-Bessemer — Tulsa, Okla.

The appointment of C. A. Weaver to the post of Service Manager, Tulsa Field office, has been announced by George Edick, Sales Manager Domestic Division of The Cooper-Bessemer Corporation.

Since joining Cooper-Bessemer in 1951, Mr. Weaver has been responsible for field service work in various areas of the country where engines and compressors are used. Mr. Weaver will now be directly responsible for all operations of the company's equipment in the greater Tulsa area.

Prior to joining Cooper-Bessemer, Mr. Weaver was associated with the Fluor Corporation.

Cooper-Bessemer serves the gas transmission, petroleum and petrochemical industries with its gas, diesel and Gas-Diesel engines, reciprocating and centrifugal compressors. Plants are located at Mount Vernon, Ohio, and Grove City, Pennsylvania.

(Continued on Page 88)

## VERSATILE, NEW PLUG-IN STEAM GENERATOR



Series "R" SPEEDYLECTRIC generates steam to 250 psig. and temperatures to 405°F. Write today for Bulletin SG-200. Larger capacity Steam-Jet Cleaners available. Write for Bulletin JC-100.

### Easily Converted to a Steam-Jet Cleaner!

For plug-in operation on 110- and 220-volt circuits, the precision-built, compact, ASME Code Series "R" SPEEDYLECTRIC steam generator is ideal for laboratory, pilot plant and even production processes requiring small volumes of high-pressure steam!

This midget-size SPEEDYLECTRIC, like all SPEEDYLECTRIC models, features safe, simple, electrode heating with precise current control. Easily converted to a Steam-Jet Cleaner for sterilizing and de-icing, by means of an accessory kit.

See our catalog in Sweet's "Plant Engineering" File.

**Pantex**

MANUFACTURING CORPORATION

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Pawtucket 3, Rhode Island



## Cutter Blades

SINCE many milling machines use inserted blades in the milling cutters, a common machine shop operation is that of sharpening the cutter blades. Each blade is held

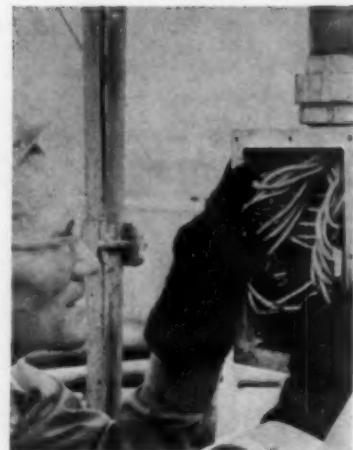
in place by a cap screw, which must be removed and replaced when the blade is sharpened.

One company has cut the time for sharpening cutter blades in half by using an air operated cutter vise to hold the milling cutter, and a Size 504 Ingersoll-Rand Impactool to remove and replace the cap screws.

## How to Avoid Wire Burn-Outs

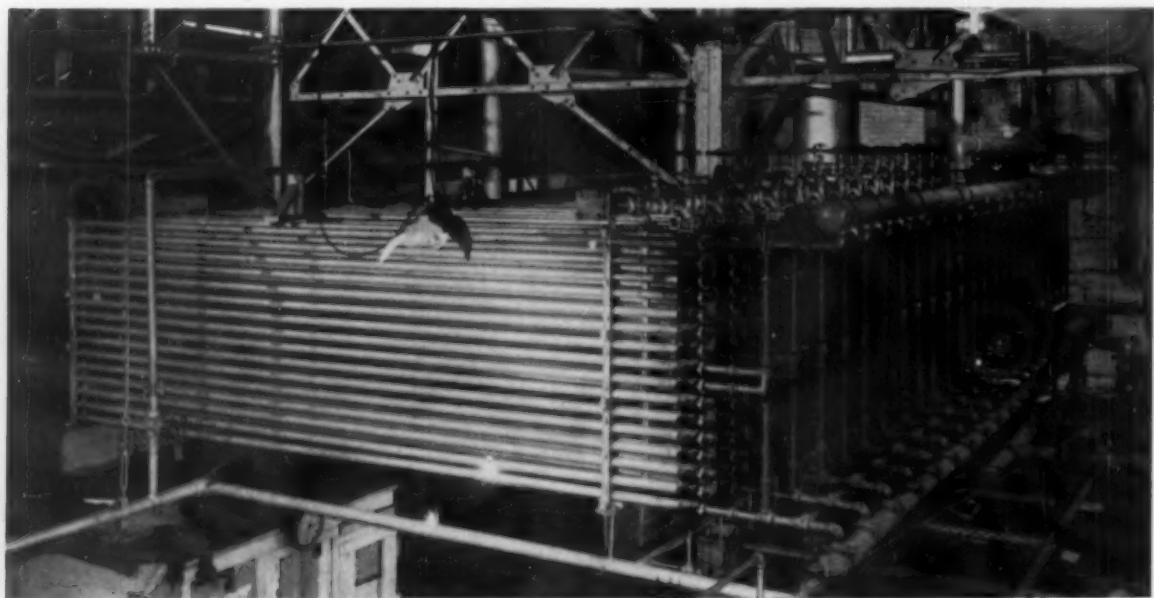
DO YOU have electric wire or cable that's exposed to high ambient temperatures? If so, there's now a way to avoid burn-outs and save real maintenance money.

A Gulf coast refinery was plagued with frequent failures of wiring on a hydroformer. Temperatures up to 250 F caused conventional wire insulation to burn out in as little as three months. Refinery engineers then replaced



some five miles of the old wire with silicone rubber covered wire. Result: excellent service.

Wire covered with Silastic, the Dow Corning silicone rubber, has eliminated so much downtime and saved so many man-hours that it is now specified for all new and replacement wiring in areas where it will be subjected to over 140 F.



**NEW ORLEANS, LOUISIANA** — Ammonia gas, fed into this 23-stand double pipe condenser under an average of 175 lb pressure, maintains —20 to +45 degree temperatures in refrigeration rooms at Pelican Ice Company.

The 16-pipe high, "off-the-floor" condenser was fabricated of corrosion resistant 4-D wrought iron pipe, sizes 1 1/4-in. and 4-in. The self-fluxing action of

the easily welded metal provided sound, tight joints to guard against leakage of gas.

Byers-produced 4-D wrought iron pipe was used for both inner and outer condenser tubing at the Pelican plant which produces 300,000 lb of ice per day. The plant houses a 350 ton refrigeration load for a five-story warehouse, an ice cream plant and a food processing plant.

## Unusual Air Supply for Soot Blowing and Station Service

**ELECTRICAL** utility engineers will watch with interest, the performance of an unusual, or what might be called an out-of-the-ordinary, type of air supply for boiler soot blowing and station service in a power plant. The new system has been selected for the 1,715,000-lb-per-hour Unit 8 in the Avon Station of the Cleveland Electric Illuminating Company, Cleveland, Ohio. Number 8 unit will be equipped with 138 Vulcan soot blowers using air as the primary blowing medium and controlled by a Selective-Sequence system.

The exceptionally interesting feature of the plant's air supply is that the air will be furnished by a fully automatically controlled centrifugal compressor, supplying air at 300 psi for soot blowing and at reduced pressure of 125 psi for station service. The compressor is a 9,160-rpm, 7,000-cfm, 2-cylinder machine with intercooling, driven by a 2,500-hp motor.

The unique installation will provide the greatest flexibility possible in an air supply. The compressor may, on low air pressure and capacity requirements, furnish the plant with station service air at utilization pressure at low horsepower input. Then, when soot blowing time comes the operator merely changes the pressure set point. The compressor then swings into full pressure and capacity output to take care of soot blowing requirements.

The purpose of the automatic Copes-Vulcan control system is to assure that soot blowing requirements are taken care of first and station service second, with exhaust to atmosphere only when total requirements are so low that compressor surging is imminent. When the soot blowers are idle, the compressor will supply all other station air requirements while the old reciprocating machines remain on stand-by.

The soot blowing service intro-

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duces an intermittent off-on demand for air ranging from 70 sec. to 41 min. consumption time intervals. Also, there are frequent sequential periods of zero air demand in going from one pair of operating soot blowers to the next in the soot blowing sequence of 5 to 45 sec. Thus, the air demand is frequently changing from zero to maximum and back to zero as the blowers are operated. The control system is to be designed and built by Copes-Vulcan Division, Blaw-Knox Company.

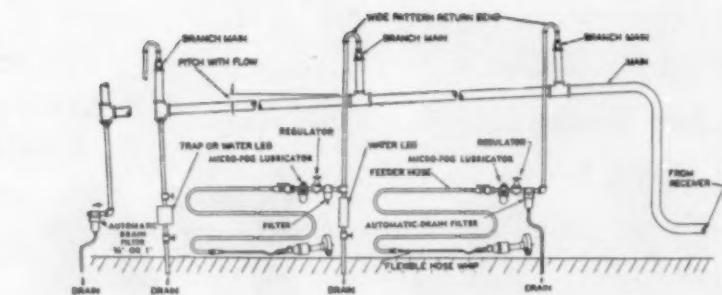
## Conveyor Belts

### BELT TRANSPORT

methods move mountains of materials each year, and they do it at a minimum of cost, thanks to ever increasing improvements in design and maintenance techniques.

Since the price of cast iron idler rollers is only about 10% lower than the much better pressed steel type equipped with ball or roller bearings, it is becoming increasingly popular to install the better type roller. The cast iron roller with its babbited sleeve bearings and grease cup method of lubrication leaves much to be desired in comparison with modern anti-friction bearings which require lubrication at infrequent intervals. The occurrence of "frozen" rollers has ruined many a belt that dragged over a demobilized roller for an indefinite period.

The carrying capacity of a conveyor belt so loaded that the upper surface of the load comes within a given distance of the



### Proper Air Line Installation Means Efficiency

1. Compressed air piping should be large enough to avoid excessive pressure drop under maximum flow conditions.
2. It should contain as few restrictions as possible. Use sweeping bends wherever possible instead of sharp turns.
3. Drop lines, valves, and connections should be large enough to accommodate maximum rated flow requirements.
4. Provide pipe lines with a means of extracting water or condensate.
5. Pitch air piping in direction of air flow so that water will be carried to traps or water legs in low points of piping system. Drain these regularly. Automatic drain filters are recommended.
6. Never attach drop lines or hose connections to the bottom of air mains. To prevent condensed moisture from reaching the equipment make connections at top of main and use long radius return bends.
7. Filter, regulate, and lubricate compressed air as close to the point of application as possible. The maximum amount of contaminants will then be filtered, there will be less pressure drop between regulator and end use point, and the lubricant will have less distance to travel to reach the equipment.

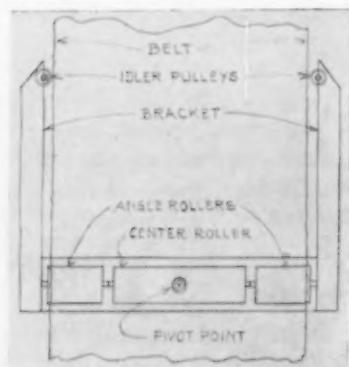
edges increases with steepness of troughing up to 45 degrees. The disturbance of the load in passing over the troughing idler however increases in direct ratio with an increase of side slope, and there is a corresponding increase in belt wear and power consumption. It is usually considered a good compromise to establish the troughing angle of 30 degrees. At such an angle it is easier to keep a belt straight and there is less failure of belts by longitudinal cracking.

Belts fail to track properly for several reasons, and then unequal tension causes one side to become longer than the other. Cutting off the excess length at the splice at periodic intervals then is necessary. The best method however is to keep the belt loaded uniformly and in addition make use of

a device to automatically realign the belt as it creeps progressively over to one side or the other of the troughing rollers.

Such a device is shown in the sketch. A section of 8 in. wide channel is used as a pallet on which to mount a set of troughing rollers. A 1-in. diameter bolt in the center provides a swivel arrangement that permits the assembly to align the belt by reason of two, 4 in. diameter rollers mounted on angle iron brackets extending forward from the 8 in. channel.

As the belt begins to deviate from its correct path in line with the outer edge of the sloped troughing rollers it makes contact with the auxiliary roller mounted on that side of the belt run. The resulting pressure causes the bracket to swing the swivel



mounted troughing roller assembly, and the belt is forced to assume a straight path again.

The device does not correct the unequal length of a belt that has been distorted by abuse due unequal loading, misaligned head pulleys, or the lagging on them. However, it does keep errant belts on the straight path they were intended to traverse. They also call attention to need for lining up. *Editor's Note:*

*Self aligning idlers are standard equipment on well designed installations and are available from manufacturers of conveyor belt equipment.*

## Marks' Handbook

Marks' Mechanical Engineers' Handbook, Sixth Edition. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

Revised by Theodore Baumeister, Editor-in-Chief; 2,270 pages; \$23.50.

This well-known handbook gives a wealth of practical data in every branch of mechanical engineering. Arranged in handy reference form are answers to thousands of questions of every type — covering theory, standards, and practices — compiled by over 90 experts, each a specialist in his field.

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Areas in which thorough revisions have been made or new subjects introduced include: Mechanics of materials — Numerical analysis and computing machines — Vibrations — Aerodynamics — Jet propulsion — Atomic power — Automobiles — Steam boilers — Instruments and controls — Railway engineering — Aircraft propellers — Corrosion — Industrial engineering — Turbo compressors — Gas turbines — Displacement pumps — Fans — Pipe and pipe fittings — Lubricants and lubrication — Structural design of buildings — Welding.

Best accepted practice is reflected in this edition's 18 big sections, including concise descriptions, formulas, tables and diagrams.

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This photograph of an 'immersion type radiant heater' shows a welded assembly of:

- 1—static castings (collars)
- 2—centrifugal castings (straight pipe sections)
- 3—shell molded castings (bends)

This unit provides an excellent example of our broad TRIPLE Service.

Our experience in static high alloy castings began in 1922; in centrifugal castings, in 1933; in shell molded castings, in 1955. Thus, in this radiant heater, the old blends with the new. It's an excellent example of the kind of work we do.

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# NEW Catalogs & Bulletins

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## MAINTENANCE—TOOLS EQUIPMENT & METHODS

**5 — Metal Cutters** — Bulletin 655 shows actual cost figures on various metal cutting jobs (bolt, rod, wire, chain, etc.), by using cutters, hand and power-operated cutters. — H. K. PORTER INC.

**22—Lubricator Alert** — Data sheet describes lubricator flow switch that indicates positive flow at terminal points on any force feed lubricator system. Easily installed on any existing application. Indicates lack of flow to the point of injection. — MANZEL.

**23—Boiler Gaskets** — Catalog describes wire-inserted woven asbestos and spiral wound metal-asbestos — for manholes, handholes and tube caps of all makes of stationary and marine boilers, water walls, economizers, etc. — THE BELMONT PACKING & RUBBER CO.

**29—Belting Repairs** — Two bulletins "How to Properly Join Belts" and "Belt Fastener Selection Chart" offer service help on conveyor, elevator and transmission belting. — CRESCENT BELT FASTENER CO.

**66 — Tube Expanding** — Bulletin 55 on torque control describes automatic air driven tube expander drive. Control assures uniformity of tube expanding. — THOMAS C. WILSON, INC.

**70—Multi-Purpose Grease** — Bulletins describe new single product Gulfcrrown grease (4 consistencies) that does the work of many — simplifies application and avoids errors, reduces inventory and cuts lubrication costs; grease gun or centralized system application. — GULF OIL CORPORATION.

**84 — Zinc Coatings** — Bulletin describes Galvanox, a special zinc coating applied as a paint to provide galvanic protection to metals. — SUBOX, INC.

**95—Plant Lubrication** — The Lubriplate Service Handbook — Gives valuable information on the

subject of lubrication in all its forms, intended to be of everyday use to plant superintendents, managers, maintenance engineers and those in charge of plant production and maintenance. — LUBRIPLATE DIVISION, FISKE BROTHERS REFINING CO.

## FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

**100—Power Plant Pumps** — Bulletin BJP 58-8 covers complete line of standard pumps for all power plant requirements — from 12,000 hp, doublecase boiler feed pump, to condensate, circulating and booster pumping duty. Also, special pumps for nuclear power plant installation. — BYRON JACKSON PUMPS, INC.

**110 — Deaerator** — Publ. 4651 describes design that eliminates tubular vent condensers without impairing efficient purging of non-condensable gases. Unit handles wide range of operating conditions. — COCHRANE CORPORATION.

**122—Industrial Fans** — Bulletin 702 covers Type XL fans for air and material handling. Volumes to 130,000 cfm pressures to 18" SP. Catalog 855 describes Pressure Fans. Volumes to 12,000 cfm, 10" to 50" SP. — CLARAGE FAN CO.

**132—Glassed Centrifugal Pumps** — 12 page Bulletin 725.2 describes line of glassed pumps for handling corrosive acids and alkalies. Every part of pump exposed to liquid has a tough glass surface. Specification, ratings, dimensions. — GOULDS PUMPS, INC.

**135—Heat Exchanger** — Bulletin 132 shows how sectional Aero unit gives close temperature control, saves labor, power, and water; design improves heat transfer to outdoor air by evaporation; 7,000,000 to 18,000,000 Btu/hr capacity range. — NIAGARA BLOWER COMPANY.

**168—Centrifugal Pumps** — Bulletin 720.4 describes company line of single stage side suction centrifugal pumps with open impeller for wide variety of industrial uses. 13 sizes, 1 1/4" to 8", capacities to 3000 gpm and heads to 180', with the addition

of two large sizes: 6 x 8 - 13 and 8 x 10 - 11. — GOULDS PUMPS, INC.

**189—Air Traps** — Bulletin 289 describes ball float traps for draining water from air, gas or steam lines, or for draining light liquids from gas under pressure. Physical and selection data, prices, etc. — ARMSTRONG MACHINE WORKS.

## INSTRUMENTS—METERS CONTROLS—REGULATORS

**200—Control Centers** — Built to specific needs of the job to prevent costly breakdowns later. Units custom-built from best components. Specializing in quick deliveries. — THOMAS B. COMBS COMPANY.

**201—Valves & Gages** — Handy guide No. 36 gives data & prices on valves, liquid-level gages & accessories for process and power industries. — PENBERTHY MFG. CO.

**204—Floatless Level Control** — Data sheets PC-37 describe control that is unaffected by surface agitation and equipment vibration. Simple, compact, one adjustment unit. — LESLIE CO.

**206—Water Level Alarms** — Brochure D1 — Float operated low and high water level alarms and fuel cut-offs, for low and medium pressure boilers, tanks and other vessels. — RELIANCE GAUGE COLUMN CO.

**213—Meters & Controls** — Bulletin G15-1 describes and illustrates systems and instruments used in the measuring, transmitting, receiving, interpreting and controlling of 18 variables normally encountered in power plant and industrial plant operation. — BAILEY METER COMPANY.

**218—Liquid Level Controls** — Selection chart of "in stock" displacement type magnetrols. Details pump controls and low or high level alarm controls. Wide range specific gravity settings; standard length stem can be cut in field to job requirements. — MAGNETROL, INC.

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**222—Pressure Regulators** — Catalog No. 77 illustrates and describes application, operation and specifications for a complete line of reducing, back-pressure and pump-pressure regulators.—MASON-NEILAN.

**224—Feedwater Regulator** — Bulletin 1044 describes the BI Feedwater Regulator, the single-element unit employing a thermostatic-tube level controller which actuates a regulating valve in feed line. For loads from 10 to 735 psig. Includes specifications table and schematic diagram. — COPES-VULCAN DIV.

**225—Cooling Controls** — Self-powered controls for compressors, stills, solvent coolers, degreasers, small engines, etc., described in Bulletin 710; operational and hook-up sketches.—SARCO COMPANY INC.

**225—Liquid Levels** — Bulletin 532 describes indicator which gives a reliable, automatic reading of storage tank contents. 20" dial in 3 x 10" case saves panel space. No outside power source needed; can be located up to 250 ft from tank. — THE LIQUIDOMETER CORP.

**253—Combustion Analyzer** — 4 p Specification E65-5 describes the "Heat Prover" which indicates per cent by volume oxygen and combustibles present in exhaust gases from all types of boiler and industrial furnaces. — BAILEY METER COMPANY.

**287—Color-Port Water Gage** — Bulletin WG-1814 describes the new gage for high pressure boilers (up to 3300 psi). Gives full details on design and operation and shows how it gives greater visibility and greatly reduced maintenance requirements. — YARNALL-WARING COMPANY.

#### PLANT CONSTRUCTION—WELDING EQUIPMENT—SPECIALTIES

**300—Fact Folders** — 23 up-to-date industrial fact-file folders on aluminum, steel, copper, stainless steel, insulation, roofing and other industrial supplies immediately available from 9 Southern warehouses. — REYNOLDS ALUMINUM SUPPLY CO.

**308—Wrought Iron in Steam Condensate Lines** — Special report contains information on factors affecting corrosion, comparative service records, suggestions for minimizing maintenance. — A. M. BYERS CO.

**310—Incinerator** — Metal cased, insulated, refractory lined incinerators for industrial and commercial use. City smoke code approved. Fast, economical installation — any size and capacity. —

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**315—Pressure Vessels** — Catalog 100 discusses your plate fabrication problems and shows how company custom-fabricsates hot water storage heaters, tanks, air receivers, blow-off tanks, etc. Corrosion resistant linings and materials featured. Suggested specifications and other valuable technical data given. — J. J. FINNIGAN CO.

**317—Drier Compressed Air** — Bulletin 130 shows how Aero After Cooler cools compressed air or gas below temperature of surrounding atmosphere; no further condensation in your air lines. Installed outdoors. Saves cooling water. Gives better operation of air-operated tools, etc. — NIAGARA BLOWER COMPANY.

**324—Painting New Plants** — "Painting of New Plants to Reduce Costs" describes how company's lead-suboxide paints can save 1 or 2 coats of paints on new plants. Eventual repainting costs are cut as well since these paints form a dense, metallic lead film which can be recoated without expensive scraping, sanding or repriming. — SUBOX INC.

**333—High Alloy Castings** — General selection guide Bulletin 3354G covers chrome-iron and chrome-nickel castings which resist corrosion, high temperature and abrasion. — DURALOY COMPANY.

**336—Retaining Walls** — Catalog RW 3555 shows how bin-type walls stabilize slopes and gain valuable ground for buildings, parking areas; all metal cellular construction; all-bolted assembly means small crews can do the job. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

**347—Chemical Feeders** — 34 p Catalog 1136 helps you select the exact metering pumps needed to meet any requirements. — MANZEL.

**349—Water Control Gates** — Illustrated folder describes water control gates for industrial uses. Data given on watertightness, range of operating heads and sizes. Details are illustrated with condensed tabular matter. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

**380—Compressed Air Dryers** — 12 p Bulletin describes heatless air dryers that extract both water and micronic particles; reduce moisture to zero dewpoint. 23 sizes range from 25 cfm for single instrument to 3000 cfm for entire plant air system. — VAN PRODUCTS CO.

**383—Crushing Equipment** — Bulletins 937, 939, and 949 cover re-

duction machinery for coal, alum, bones, salt and chemicals. — JEFFREY MANUFACTURING COMPANY.

**386—Rigid Frame Buildings** — 8 page bulletin "Dixiesteel Rigid Frame Buildings" — low cost, flexibility of design, durability, and minimum maintenance; also triangular or bow-string truss all-steel roof systems; fabricated for rapid erection. — ATLANTIC STEEL COMPANY.

#### PIPING—VALVES—FITTINGS STEAM SPECIALTIES—TRAPS

**401—Steam Traps** — Bulletin 775 gives price, dimension and capacity data on Open Float and Thermostatic Steam Traps for trouble-free heating service. — ARMSTRONG MACHINE WORKS.

**407—Piping Materials** — Bulletin reports on intensive investigation into problem of main steam piping materials and gives data on stress rupture characteristics of Types 316 and 347 stainless steel piping adjacent to welded joints. — PITTSBURGH PIPING AND EQUIPMENT COMPANY.

**426—Pressure Regulating Valves** — Standard line of regulating valves for steam, water and air service described in Cat. 77. Complete specification data. — MASON-NEILAN DIV.

**437—Piping for Permanence** — Bulletin covers a variety of services where wrought iron pipe saves because it serves longer. Corrosion costs you more than wrought iron. — A. M. BYERS COMPANY.

**442—Sewer Pipe** — Folder SF-14056 describes how Smooth-Flo Sewer pipe provides top flow capacity and strength of corrugated metal. Flexible design, strong joints, and centrifugally-spun asphalt lining. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

**448—Steam Trap Troubles** — Booklet for plant engineering personnel "Banish Your Steam Trap Troubles." — YARNALL-WARING COMPANY.

**468—Steam Traps** — 40 p engineering manual aids engineers and maintenance men in sizing, specifying and buying of steam traps and other fluid specialties. All data necessary to engineer a trap installation is included. — V. D. ANDERSON CO.

**493—Unions & Valves** — Complete company line of pipe unions and check valves covered in Catalog 56. New Four-Star lug nut unions & spring controlled check valves in

## Bulletins (Cont.)

cluded. — CATAWISSA VALVE & FITTINGS COMPANY.

**494—4-D Wrought Iron** — "New Dimension in Corrosion Control" includes test section which is graphically illustrated and shows comparative corrosion resistance of 4-D Wrought Iron, standard wrought iron and other ferrous metals. — A. M. BYERS CO.

### BOILERS—STOKERS TURBINES—BURNERS

**505—Refractories** — Paco High Heat Duty and Super Duty Plastic Refractories. Fire brick, high temperature cement, castables. Installation and engineering service. Free estimates and inspection. — NORTH STATE PYROPHYLLITE CO.

**506—Package Boilers** — Practical construction with Continental two pass design described in Bulletin BE100. Units range in size from 20 to 600 hp; 15 to 250 pressures burning oil, gas or combination. — BOILER ENGINEERING & SUPPLY.

**509—Free Coal Counseling** — General information on how Coal Bureau engineers will advise on selection, transportation and utilization of the right coal for your purpose. — NORFOLK AND WESTERN RAILWAY.

**512—Steam Turbines** — Advances in design of double and triple-flow tandem ratings to 250 mw, and of 3600/3600 rpm and 3600/1800 rpm close-coupled cross-compounded arrangements to 500 mw and larger, described in Catalog 03R8620. — Power Equip. Div., ALLIS-CHALMERS.

**527—Pneumatic Spreader Stoker** — Bulletin shows how unit combines coal drying, metering, conveying, uniform burning and cinder return in one efficient system. — IRON FIREMAN MFG. CO.

**540—Coal for Heating & Cooling** — 16 page brochure describes boiler plant for heating and cooling the Hillside, Ill. Shopping Center. Drawings shows the boilers and coal and ash-handling equipment. — BITUMINOUS COAL INSTITUTE.

**553—Boiler Start-Up** — Bulletin 1048 describes a moving temperature probe which patrols critical boiler gas passages and gives adequate warning of incipient hot spots during lighting off. Includes structural details and specifications of

probe as well as explanations of the operating features and methods of control. — COPES-VULCAN DIVISION.

lation methods, principles of operation and individual unit specifications. — JEFFREY MANUFACTURING CO.

### WATER TREATMENT—HEATING & AIR CONDITIONING—DUST & FUME CONTROL—REFRIGERATION

**701—Exhausting Corrosive Fumes** — Bulletin 702-A shows how corrosive fumes can be exhausted with rubber, lead lined or specially coated fans. — CLARAGE FAN CO.

**703—Air Conditioning** — Bulletin 122 describes and illustrates operation and suggests applications for air conditioning method that controls humidity to 1% rh and temperature to 1 F (up to 140 F) with accuracy, independent of moisture sensitive instruments. — NIAGARA BLOWER CO.

**704—Water Conditioning** — Brochure describes company's engineering services — zeolite water softeners, filters and purifiers, modernized and rebuilt water softeners, aerators and degasitors and process and boiler water conditioning. — SOUTHERN WATER CONDITIONING, INC.

**705—Test Your Tower** — Bulletin offers simple, proved method by which you can determine how closely your actual tower performance measures up to specified performance. Particularly applicable to operations geared to temperature of process cooling water. — THE MARLEY COMPANY.

**710—Scale Remover** — Bulletin shows how Anco Scale Remover quickly eliminates scale in boilers, water lines, refrigeration and air conditioning systems. — ANDERSON CHEMICAL COMPANY.

**715—Amine Treatment** — Return line corrosion is a critical problem in maintaining economical, efficient power plant operation. Bulletin CP-100 shows how amine treatment is an easy, effective and economical way to eliminate pipe corrosion problems. — THE BIRD ARCHER COMPANY.

**716—Dust Collection** — Whether nuisance elimination or process material recovery, check on Whirlex Dust Collector Units. Engineering data available. — THE FLY ASH ARRESTOR CORP.

**719—No Frost Refrigeration** — Bulletin 105 describes with diagrams and photographs method used for food freezing, chilling and warehouse refrigeration on largest scale without frost or ice formation, insuring always full capacity and uni-

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### ENGINES—DRIVES POWER TRANSMISSION MATERIALS HANDLING

**600—Conveyor Idlers** — Bulletin SI-116 describes pre-lubricated "UST" Conveyor Idlers. Incorporating Timken bearings and Garlock Klozures, construction permits operating without lubrication for 1-3 years or more. — CONTINENTAL GIN COMPANY.

**604—Motor Units** — Catalog 51 describes motor units for accurate performance and longer, lower cost life for operation of valves, floor-stands and sluice gates. — CHAPMAN VALVE MANUFACTURING CO.

**614—Vertical Transportation** — Elevator Catalog — Describes and illustrates details of passenger and freight elevators, escalators, dumbwaiters, and modernization and maintenance equipment for use in industrial, utility and service plants. — OTIS ELEVATOR CO.

**640—Belt Conveyors** — Manual 909 designed to serve both expert and layman in field of materials handling by conveyor. All but the most unusual applications can be specified from the contents. — JEFFREY MFG. CO.

**650—Vibrating Feeders & Conveyors** — 96 p book covers company line of electric vibrating feeders and conveyors. Includes controls, instal-

## Bulletins (Cont.)

form temperature. — NIAGARA BLOWER CO.

**722—Packaged De-Ionizers** — Bulletin PK describes complete line of de-ionizers, which produce chemically pure water at flow rates up to 1000 gph. Standardized units, shipped from factory fully-assembled, eliminating complicated installation problems, and virtually eliminating service problems. Recommended for laboratory and plant production uses. — ILLINOIS WATER TREATMENT COMPANY.

**748—Stop Fungal Decay** — Bulletin MT-58 describes company's preservative wood treatment for cooling towers, pinpoints organisms that destroy effective performance and prescribes treatment that arrests these destructive organisms, as well as the application techniques. — THE MARLEY COMPANY.

**764—Cooling Equipment** — Bulletin 80-D describes company's complete line of commercial and industrial equipment—operating principles, design features, etc.—FRICK CO.

### ELECTRICAL

**801—Motors** — Bulletin describes and catalogs more popular a-c motors from 1 to 600 hp, for every process and manufacturing requirement. Single phase and polyphase; surpass

NEMA specifications. — BROOK MOTOR COMPANY.

**802—Small Relays** — Simple solenoid design with only one moving part described in Bulletin 700. Silver alloy contacts need no cleaning, filing, or other maintenance. — ALLEN-BRADLEY CO.

**805—Power Factor Correction** — 24 page catalog 50B shows how you can cut power costs by installing correction capacitors on motors and other inductive electrical equipment. Greater loads can be handled from existing circuits. Wiring, transformer and switchgear costs can be greatly minimized in new installations. — SPRAGUE ELECTRIC CO.

**821—Electric Strip Heaters** — Bulletin F1566 shows how to quickly and easily bolt or clamp Chromalox strip heaters to platens, dies, kettles, tanks, etc., for advantages obtained with electric heat. — EDWIN L. WIEGAND COMPANY.

**842—Circuit Protection** — Bulletin F15 describes the maintenance free Fusetron fuses which protect motors, solenoids, coils and transformers against burnout, and which increase production by eliminating needless blows. — BUSSMANN MFG. CO.

**855—Wiring Analyzer** — 4 page bulletin describes Model 301 Adequate Wiring Analyzer which quickly, simply and easily tests wiring without confusing calculators or slide rules. — SPRAGUE ELECTRIC COMPANY.

## Fuel Cells

**EFFORTS** are being made to cut the cost of electric power made from conventional fuels through the use of fuel cells. Experimental models are under development which convert the heat of burning fuel directly into electrical energy by an electrochemical process.

Speaking at the annual ASME meeting, Everett Gorin and Howard Recht of the Consolidation Coal Company said that there has been a decided awakening of interest in fuel cells during recent years and that the new cells are beginning to meet requirements of steady output.

All experimental units for which any success has been claimed use a gaseous fuel, but the authors

pointed out that ultimately such gases can be produced from the world's abundant supply of coal.

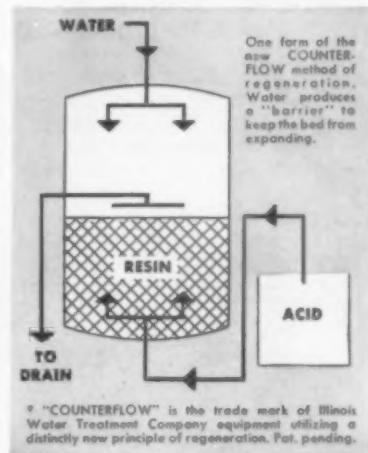
If commercial fuel cells are ever developed they will permit coal to remain competitive with nuclear power on the basis of fuel cost over a much longer period than would be the case for a conventional steam plant. Figures indicate that the fuel cell could show a lower fuel cost for the indefinite future than a nuclear plant at a location close to the coal mine.

Nothing can be said as yet about the ultimate economics of the fuel cell. SPI readers can obtain a paper describing development work carried out under the sponsorship of the U. S. Army Signal Corps. Copies of No. 58-A-200 are available at 80 cents from the Order Dept., ASME, 29 West 39th St., New York 18, N. Y.



## COUNTERFLOW\*

### REGENERATION OF ION-EXCHANGERS



\* "COUNTERFLOW" is the trade mark of Illinois Water Treatment Company equipment utilizing a distinctly new principle of regeneration. Pat. pending.

"COUNTERFLOW" is a method whereby upward regeneration, which has long been recognized as most desirable, is successfully accomplished by establishing a "barrier" at the resin face.

## LOOK AT THESE RESULTS!

- De-ionizer in a power plant. Conductivity of effluent improved from 10 micromhos to 4 micromhos after conversion to COUNTERFLOW. Cation leakage, expected at 4 ppm with downflow regeneration, actually is only 1 ppm.
- Chemical company in Middle West, 480 ppm TDS in raw water. Expected cation leakage with conventional regeneration, 9 ppm; with COUNTERFLOW, only 1.2 ppm.
- Distillery in Middle West. TDS in raw water, 575 ppm. Expected cation leakage with conventional equipment, 6 ppm; with COUNTERFLOW, is actually only 1.5 ppm.
- Western power plant, converted to COUNTERFLOW. Savings in acid reduction, \$16,000.00 per year. TDS in raw water, 342 ppm. Predicted cation leakage from curves for conventional design equipment, 4 ppm; with COUNTERFLOW, actually only 1.6 ppm.



ILLINOIS WATER  
TREATMENT CO.  
840 Cedar St.  
Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.  
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.



## NEW Product Briefs

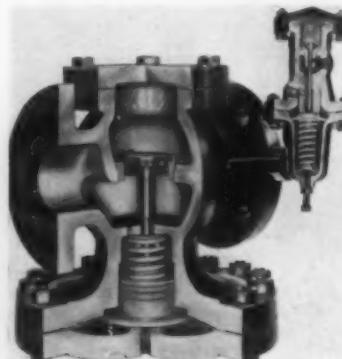
... there is always a BETTER WAY

### External Pilot Steam Regulators

**D-1** Kieley & Mueller, Inc., 64 Genung St., Middletown, N. Y., have a new line of external-pilot steam pressure regulators that have greater capacity per valve size, provide accurate, fast-response regulation, and are suitable for continuous or intermittent duty.

The new regulator incorporates an integral bleed orifice which eliminates one inter-connecting pipe line usually required on pilot-operated regulators of this type. Bulletin 471A gives details.

Called the Type 471, the regulator



is capable of large pressure reductions and the tight, dead-end shut-off necessary for batch-type appara-

tus such as sterilizers, vats, kilns, presses and ovens. Positive shut-off is accomplished by a single-seat valve arrangement which employs stainless steel valve discs and seat rings.

The regulator consists of a main valve that will handle maximum pressures of 125 or 250 pounds, and an external pilot valve. If the main valve must be inconveniently located, the pilot can be remotely installed in an accessible location where quick pressure adjustments are easily made.

### Cutting or Beveling Out-of-Round Pipe

**D-2** Designed to cut various shapes of pipe intersections automatically is the new model of shape cutter attachment, manufactured by H & M Pipe Cutting & Beveling Machine Co., 311 E. 3rd St., Tulsa, Okla. It is lightweight and features easy, fast mounting.



The addition of a new, free-wheeling roller assembly that turns a full 360° is an improvement to the Out-of-Round attachment. The roller rides the surface of the pipe and automatically makes corrections for any imperfections.

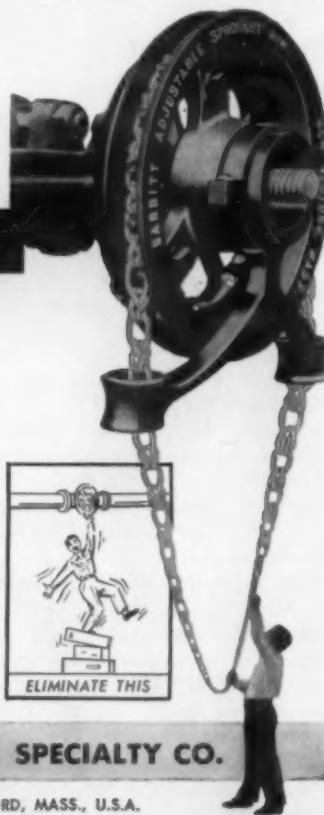
### Safe Operation Of OVERHEAD VALVES

with a

**Babbitt**

*Adjustable  
SPROCKET RIM  
with Chain Guide*

- Simplifies pipe layout
- Fits any size valve wheel
- Easy to install and operate
- Operates any valve from plant floor
- Time and money saving fixture
- No maintenance; first cost only cost
- Packed, completely assembled, one to a carton
- Hot galvanized, rust-proof chain available for all sizes
- Easy to follow instructions with each unit
- Your supplier carries complete stocks
- Write for new descriptive catalog sheet and prices

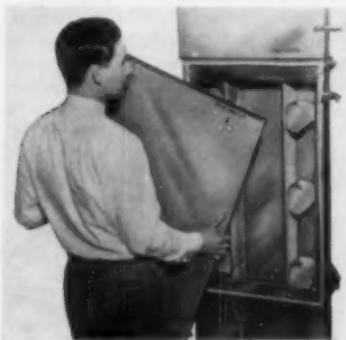


**Babbitt** STEAM SPECIALTY CO.

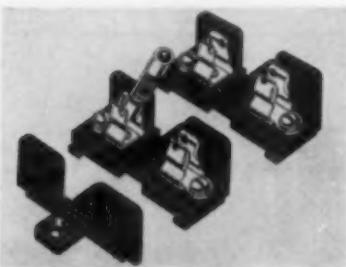
3 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

## Bulk Material Conveyor Elevator

**D-3** Bucket Elevator Co., 260 Springfield Ave., Summit, N. J. has designed a "V" Series of bulk material conveyor elevators made specifically to solve problems of the chemical, pharmaceutical and food industries.



The elevator features removable covers held in place with quick opening toggle clamps, seamless buckets, rounded corners and shrouded bolts — each contributing to easy cleaning.



## Add-on Fuse Blocks Protect Small Motors

**D-4** To simplify protection of solenoids or small motors or control apparatus on multiple circuit equipment are add-on fuse blocks, designed by Bussmann Mfg. Div., McGraw-Edison Co., University at Jefferson, St. Louis 7, Mo.

The blocks may be assembled into a unit fuse block of one or any number of poles without the necessity of disconnecting terminal leads on other units.

Each fuse can be used as a circuit disconnect. Specially designed clips permit raising one end of fuse to a right angle position to the fuse block where it will be held firmly in place.

*When Time  
Means Most...*

*Call the  
Steel Service Center  
nearest you for*

## DIXISTEEL<sup>®</sup> ROLLED PRODUCTS



It costs you money when you run out of steel bars and shapes at a critical time! On the other hand, large steel inventories tie up capital and space. Avoid both pitfalls. Order DIXISTEEL rolled products from your nearby Steel Service Center. You can count on fast, dependable delivery of hot rolled bars and shapes in a wide variety of sizes—and always of the same high-quality.

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of the Steel Service Center nearest you.*

## Atlantic Steel Company

P. O. Box 1714 • Atlanta 1, Georgia • Trinity 5-3441

## New Product Briefs (Continued)

### Welding Electrode for Nickel Alloys

**D-5** A welding alloy able to withstand the extremely rigorous heat and corrosion conditions of production has been introduced by **Eutectic Welding Alloys Corp.**, 40-40 172nd St., Flushing 58, N. Y. This alloy, NiTectic 222, is designed for use where one of the joining members is over 50% nickel.

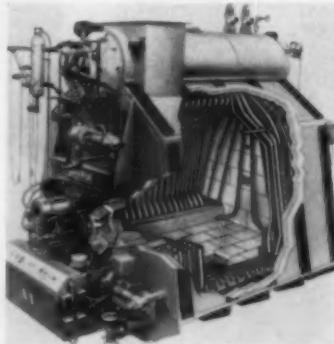
Weld is flat, machinable and crack-free. Slag coverage is full and easily removed with standard hand tools.

"Low Amp" NiTectic 222 (DC) is available in 3/32", 1/8", 5/32" and 3/16" diameters.

### Package Boiler

**D-6** The new Model AS (capacities from 4,000 to 13,000 lb/hr) has been added to the packaged boiler line of **Superior Combustion Industries, Inc.**, 1475

Broadway, New York 36, N. Y. Basic construction is the A type tube arrangement.



Efficient heat transfer, without baffles and gas collecting pockets, and protection for refractory has been achieved. Tangent tubes in the furnace wall eliminate refractory baffle between the furnace and convection tube pass of boiler.

The mechanical draft fan is mounted at the rear of the boiler, leaving the firing front uncluttered

and providing positive air cooling of the furnace floor and the front firing wall. This feature also results in more uniform air supply to the burner and better flame formation.

Rotary burners are standard on all sizes, providing fully automatic operation, maximum safety, with minimum supervision.

Other features include factory installed and piped soot blowers, air shielded-air cooled observation opening which allows full width viewing of the furnace without danger to the operator, factory installed feed-water regulator with 3 valve by-pass and complete controls mounted to the boiler front and easily accessible without the use of a platform.



### Hydraulic Rod and Bar Cutter

**D-7** With three sizes of jaws available for cutting materials up to 1/4", 1 1/8" and 1 1/2" in diameter, a new hydraulic cutter by **H. K. Porter, Inc.**, Somerville 43, Mass. is particularly applicable to continuous process cutting of rods, bars, heavy wire, etc.

Cutter and the portable heavy duty power pump are mounted on a steel plate with channel type skids. Power is applied through finger pressure on control button for all-position cutting. A quick, detached coupler permits quick changeover of cutter heads.

Cutter heads can be suspended from a self-retracting, overhead, spring balancer eliminating operator strain and speeding up cutting operations.

Cutter jaws can never be closed accidentally. 12 volt single phase voltage control gives safety and ease of operation.

## ALL MUSCLE — NO FAT!

### BROOK NEMA RERATE, TOTALLY ENCLOSED, FAN COOLED A.C. MOTORS



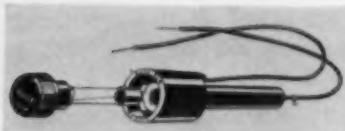
Take less space, weigh less, smaller frames than the Brook standard totally enclosed fan cooled motors—yet, performance is equal. 1 to 40 HP\*. Built to N.E.M.A. specifications for rerated motors. Same resistance to dust, fumes and moisture as the larger, heavier, standard frame t.e.f.c. motors. Maximum economy and lower first cost because of Brook modern production techniques and world-wide volume distribution. Warehouses, Sales Representatives, and Dealers throughout the country. Write for literature.

\*Standard frame t.e.f.c. motors available 1 to 600 HP.

*World's most respected motor*  
**BROOK MOTOR CORPORATION**

3553 W. Peterson Ave., Chicago 45, Illinois  
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250 University Ave., Toronto, Ontario





### Fuse-Fuseholder Protect Fluorescent Fixtures

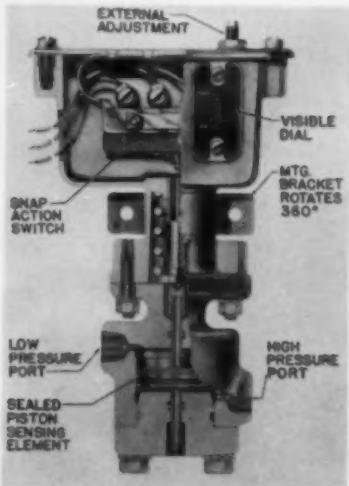
**D-8** A combination fuse and fuseholder for the protection of fluorescent fixtures and other equipment operating on circuits of 300 v or less has been developed by **Bussmann Mfg. Div.**, McGraw-Edison Co., University at Jefferson, St. Louis 7, Mo.

A bayonet type knob on fuse locks fuse in holder, having an overall length of 2 7/16".

For More Free Data **FILL IN CODE NO.** on the Handy Return Card — Page 75

### Pressure Diff. Switch

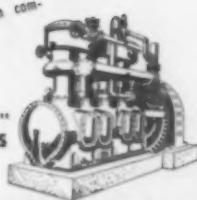
**D-9** A unit constructed by **Barksdale Valves**, 5125 Alcoa Ave., Los Angeles 58, Calif., senses a difference from 5 psi to 140 psi between two pressures. A sealed piston sensing element actuates an electric warning circuit upon increasing or decreasing of a predetermined pressure difference.



The switch is applicable to oil systems ranging from 50 psi to 6000 psi working pressure. A high proof pressure rating of 9000 psi gives protection against damage from sudden surges and shock loads. Settings simplified by external adjustment screw and visible dial.



"HEAVY DUTY" COMPRESSORS

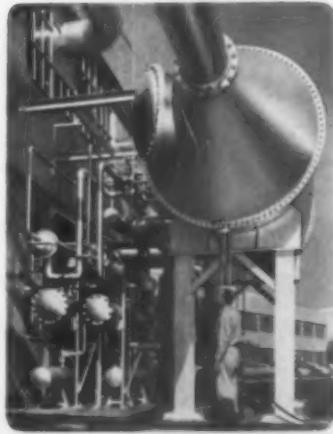


## ENGINEERS

WILL DESIGN . . . BUILD and  
INSTALL FRICK SYSTEMS . . .

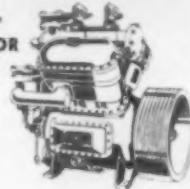
to solve your most difficult  
cooling problems.

If you need any type of industrial or commercial cooling—for quick freezing, cold storage, ice making, humidity control, low temperatures, condensing, air conditioning, or any process work—contact the nearest Frick Branch or Distributor for recommendations and estimates.



Cooling air under pressure for supersonic speed tests.

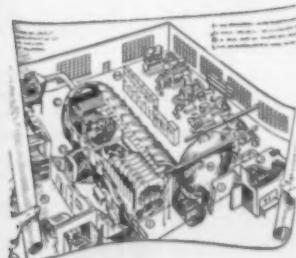
"ECLIPSE" COMPRESSOR



DEPENDABLE REFRIGERATION SINCE 1887  
**FRICK CO.**  
WAYNESBORO, PENNA., U. S. A.



Test laboratory work for temperatures down to 140° below zero.



All-weather Laboratory built for U. S. Army. Uses 3-Stage compressors, maintains Arctic, tropic and stratospheric conditions.

## New Product Briefs (Continued)



### "Ductile" Iron Pipe, Fittings & Castings

D-10 Combining the corrosion resistance of cast iron with mechanical properties similar to those of steel, ductile iron piping has been introduced by American Cast Iron Pipe Co., Box 2603, Birmingham, Ala. for use in under-

ground gas and water service mains, industrial process piping, high pressure pump piping, high temperature piping, etc.

Pipe will actually twist and bend without breaking under various adverse circumstances. A wide variety of joints are available which can be quickly and easily assembled and are "bottle-tight."

### MOST MAJOR U.S. POWER PRODUCERS REDUCE COSTS with PANALARM ANNUNCIATORS



**MAXIMUM INFORMATION** on all process variables . . . the result of 10 years system engineering by Panalarm and major power producers. That's why Universal Series 50 is the power industry's most informative annunciator. Trouble anywhere is signalled instantly—before it can grow big and expensive. "Off-normals" are pinpointed instantly, accurately for fast remedial action, reducing costly "outage" losses.

Economical, highly flexible design facilitates system expansion. Can be simply adapted to your exact requirement, avoiding costly custom designing. Proven components—e. g., almost 1,000,000 dependable Panalarm developed relays have been used in Panalarm Annunciators.

Ask your nearby Panalarm sales engineer to show you why Universal Series 50 is the power industry's No. 1 annunciator choice . . . how its adaptability and reliability can help increase your profits . . . by producing maximum information and reducing costly "outages." No obligation, of course.

Write for Catalog 100 B today.



Division of  
**PANELLIT, INC.**  
7401 No. Hamlin Ave., Skokie, Ill.

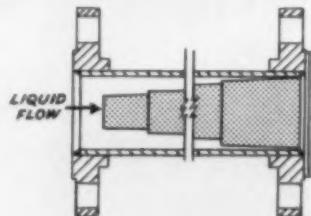
### Two-Stage Fuel Unit Delivers 40 GPH

D-11 A 2-stage fuel unit has been developed by Sundstrand Hydraulic Division, Rockford, Ill. for commercial-industrial burners using either No. 1, 2, or 4 fuel oil. Designed for use on 2-pipe installations with vacuum up to 20" when mounted with the valve underneath, the unit maintains a 40 gph firing rate.

Unit is constructed with 2 sets of Rota-Roll pumping members, each of which acts as a separate pump. Oil is drawn from the tank into the strainer chamber reservoir by the first pumping stage. When this chamber is full, excess oil and all air rise to the top and are pumped back into the tank.

Thus, the second stage draws only solid, air-free oil from the bottom of the chamber and delivers it to the nozzle under pressure. Because there is no air in the oil delivered to the nozzle, sharp, clean cutoff is assured. Also, cavitation sounds are eliminated because there is no air in the pressure or second stage.

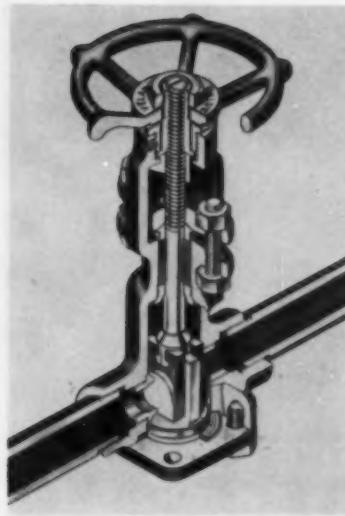
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### Piping Strainers

D-12 A new line of piping strainers for use at operating temperatures to 250 F and maximum pressure drops to 50 psi on nominal pipe sizes, ranging from 2" to 24" is offered by Air-Maze Corp., 25000 Miles Rd., Cleveland 28, Ohio. Strainers can be mounted directly into any line using conventional Schedule 40-S pipe and Series 15 flanges.

Elimination of dirt particles and other foreign matter from air, gas or liquid streams is accomplished by a special media (usually bronze wire with opening sizes from .0013" to .0307") design incorporating a cylindrical multi-step construction which provides a maximum filter area.



### Gate Valve Design Cuts Maintenance Costs

**D-13** A one-piece forged steel gate valve design, up to 2", offered by **Velan Valve Corp.**, Beekmantown Rd., Plattsburgh, N. Y., eliminates the body-bonnet leakage. The bottom guide cover permits removal and replace-

ment in the line of the wedge, stem, back seat and the 2 screwed-in seats. Positive wedge guiding is accomplished with precision machined guides and wedge dragging is not possible.

Valves are available with any trim for 600 and 1500 psi service in forged steel, carbon, alloy or stainless steel.

### High Voltage Starter

**D-14** A new starter which gives fuseless fault protection on high voltage motor drives has been announced by **The Electric Controller & Mfg. Co.**, a Division of Square D Company, 4500 Lee Rd., Cleveland 28, Ohio. Certified interrupting capacity of the new fuseless ZHA starter is 100,000 kva at 2400 volts, 150,000 kva at 4800 volts.

For simplified inspection and maintenance, the phase barrier and arc-chutes draw out horizontally, making front and rear contact tips readily accessible. No roll-out is needed. A 3-way doorlatch, interlocked between the disconnect and contactor interlocking system, pro-



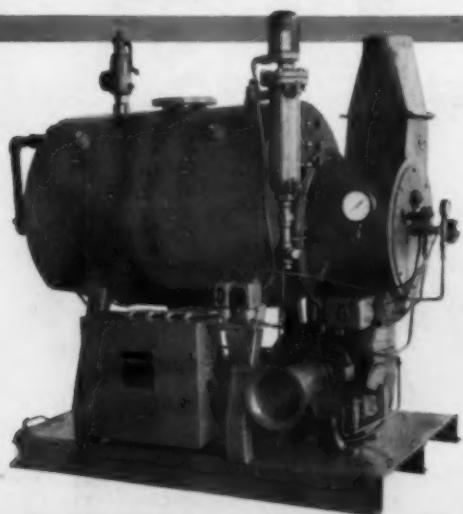
vides positive personnel safety. The disconnect is gang-operated. When the door is open, disconnect blades are visible in the open and grounded position.

Complete details are available in Bulletin 8130.

*A lot of power in a little package*

**TXT**

### VAPORMATIC COIL-N-SHELL STEAM GENERATOR



The Coil-N-Shell packs a lot of horsepower and steam generating capacity into a small space. It requires only a fraction of the space required by conventional boilers with rated steam outlet pressures from 5 to 150 psig . . . with a horsepower range from 35 to 300.

The Vapormatic Coil-N-Shell is an ideal steam generator for processing, cleaning, heating and other applications. It is completely automatic and all sizes have modulating controls as standard equipment. They are available with gas, oil and combination gas-oil fuel burning systems.

The Coil-N-Shell is a forced circulation, water tube type steam generator, employing an advanced method of steam generation. All component parts are integrally mounted on a common base, requiring only feedwater, fuel, steam and electrical connections to put it in service. It generates steam from a cold start in ten minutes and is ready for high temperature operation immediately.

For the utmost in simple, convenient, economical steam generation in the smallest space, specify the TXT Vapormatic Coil-N-Shell. Complete specifications, design and operating data, as well as rated capacities and performance features are contained in Bulletin No. 582 CSA. Write for your copy now.

**TXT**  
TEXSTEAM Corporation  
A SUBSIDIARY OF VAPOR HEATING CORPORATION  
320 HUGHES ST. • P.O. BOX 9197, HOUSTON 11, TEXAS • PHONE WA 6-2833

## New Product Briefs (Continued)



### Automatic Saw Filer

**D-15** A new automatic saw filter machine by the **Foley Manufacturing Co.** 3300 N.E. 5th St., Minneapolis 18, Minn., will file all commonly-used saws which can be sharpened with a 3-cornered file — hand saws (rip or crosscut), band saws to 4½" in width, crosscut circular saws not coarser than three points or two full teeth to the inch, and combination (rip and crosscut) circular saws.

### Pressure Regulator Pilot

**D-16** A pressure regulator pilot which reduces and regulates the pressure of steam, air, gases and liquids within fractions of 1 lb in one stage is available from **Atlas Valve Co.** 280 South St., Newark 5, N. J. Using air or water pressure (20 to 75 psi) to actuate the control valve, the pilot can be used with single and double seat valves ½" to 12" inclusive. It can be modified easily to provide for reverse action.



### Hand Spray Gun

**D-17** New hand gun manufactured by **Eclipse Air Brush Co.** 390 Park Ave., Newark, N. J., allows one-hand instantaneous control of spray pattern with either external or internal atomization, merely by changing nozzles.

Push-button fan control on the Spray-Rod not only saves paint, but gives operator the kind of control that will save spray booth maintenance and clean-up.



In your  
hot water generator...  
look to FINNIGAN

Finnigan Hot Water Generators are engineered to give you large quantities of hot water for low operating cost. The finest materials, creative skill and quality construction assure efficient performance... "Fabricated by Finnigan" assures quality. Finnigan builds hot water generators to your specifications. Call, wire or write today for complete information with no obligation to you.



TANKS, SMOKESTACKS, PIPING,  
WATER HEATERS, BREECHING, PLATE WORK

**J.J. FINNIGAN CO., INC.**

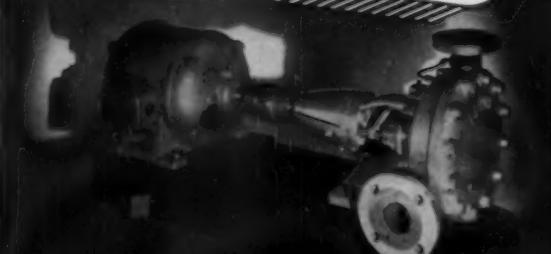
722 Marietta St., N. W., Atlanta, Georgia

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Dallas 9, Texas, 4431 Maple Avenue  
Washington, D.C., 3714 14th St., N.W.  
Kansas City 41, Mo., 1720 Harrison St.  
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**LEWIS**  
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**PUMPS**  
BULLETIN 131



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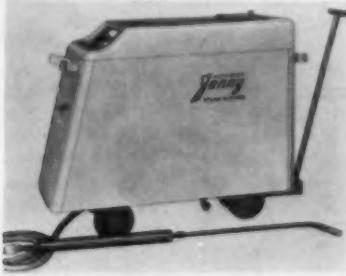
**CHAS. S. LEWIS & CO., INC.**

MANUFACTURERS

8611 GRANT ROAD • • • ST. LOUIS 23, MO.

## All-Electric Steam Cleaner

**D-18** For cleaning or sanitizing in confined areas where fumes, smoke, flame, or excess water are objectionable or hazardous, the Model E-350 Hypo-pressure Jenny by Homestead Valve Manufacturing Company, Coraopolis, Pa., is designed for average light to medium duty cleaning.



Start-up procedures (motor switch, heaters and setting solution concentration metering valve) take only 90 seconds. Safety features include automatic shut-off in case of water supply failure, hose protector plug and valve to automatically re-

lease excess pressures if line restrictions occur.

Cleaner is available for either 220 or 440 volts, 3 phase, 60 cycle, a-c current. 375 lb unit can be easily moved on 7½" rubber-tired wheels.

For More Free Data **FILL IN CODE NO.** on the Handy Return Card — Page 75

## Adjustable Speed Drive

**D-19** The Louis Allis Co., Dept. P, Milwaukee 1, Wis. has announced the availability of the Ajusto-Spede drive in ratings from ½ to 7½ hp with a stationary field construction. All brushes, commutators and slip-rings have been eliminated, substantially reducing maintenance.

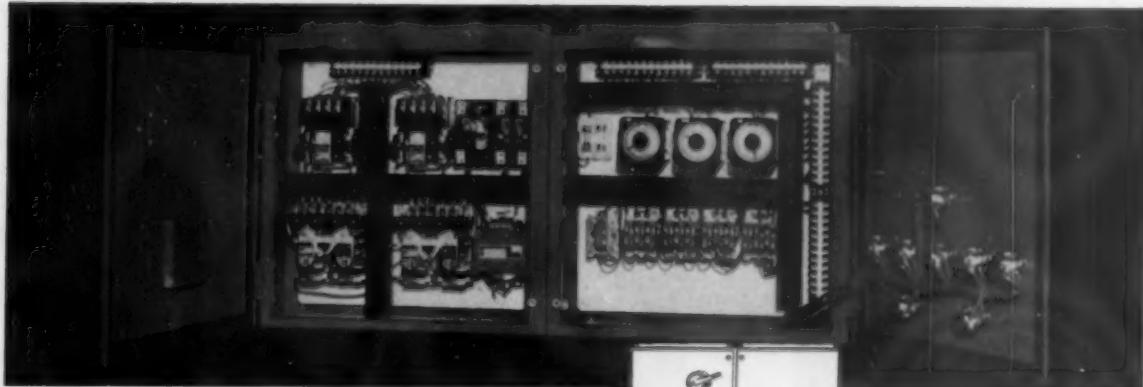
The redesigned construction in these ratings also reduces the length of the drive up to 22%. Both the a-c motor and eddy current clutch are built into a common housing. The drive shaft, height and diameter dimensions are the same as a standard motor of comparable rating. Motor end brackets are

now interchangeable with standard flanges and units can be flange-mounted to the driven machine for further space saving.



In the Ajusto-Spede drive, an a-c motor drives a clutch drum at constant speed while speed on the clutch spider (output member) is adjusted by varying d-c excitation to the clutch coil. Direct current is supplied by a small controller. Finger tip command of drive operations is concentrated in a separate operator's station. Bulletin 2750 gives details.

## Custom-built from the best components...



Save your time and money — Control centers built to the specific needs of the job prevent costly breakdowns later.

The Thomas B. Combs Co. has designed and built many control panels like the one above. Specializing in quick deliveries, we invite your problems and prints for complete estimates. Built from the best components available, Combs Panels are superior in every detail of construction. Write or phone for full information to:

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Custom Installations for 20 Years

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10, GEORGIA — PHONE PLAZA 8-5516

## Southern News Briefs — Continued from Page 69



### Annual Award Given By Miss. Valley World Trade Council

Henry B. Sargent, president of American & Foreign Power Company, has received the 1958 award of the Mississippi Valley World Trade Council for "outstanding contribution to the development of

world trade through the Mississippi Valley." Presentation of the award, given yearly since 1954, was made at a banquet climaxing the meeting of the Mississippi Valley World Trade Conference in New Orleans, La.

Mr. Sargent was cited for activities on behalf of American & Foreign Power Company and its affiliated electric light and power companies in Latin America in increasing international trade and investment and promoting mutual understanding. In addition to its other activities, the American & Foreign Power Company System is conducting a series of trade and cultural exhibits in New Orleans' International Trade Mart featuring the 11 Latin-American nations it serves.

the Florida Power & Light Co., 9 years with the General Electric Company, and 2 years as Manager of Engineering & Sales for the Metropolitan Electric & Mfg. Co., Warren, Mass. In 1945 Mr. Hiers joined Westinghouse in Pittsburgh, moving to Dallas with his family 2 years later where he was active in engineering and commercial work with Westinghouse until the middle of 1958 when he left to organize the independent engineering firm of Hiers Engineering Co.

Mr. Warren is well known over the Southeast and Southwest where he has handled engineering and supervisory work for Southwestern Bell Telephone Co., El Paso Electric RR Co., Stone & Webster, Virginia Electric & Power Co., and Florida Power & Light Co. Later he was with Dow Chemical Co. at Freeport, Texas as Power Superintendent.

He is a life member of ASME, a licensed engineer, and an active participant in engineering association work. Mr. Warren has written numerous articles for technical magazines and is Editorial Consultant in the Southwest for SOUTHERN POWER & INDUSTRY.

### U. S. Rubber — Tex.

Field Erection and Welding Co. of Houston has been named a franchised applicator of U. S. Permonbond tank linings by United States Rubber Co.

The protective linings division of the Texas company, located at 6322 West 34th Street, Houston, will handle application of U. S. Rubber's corrosive-resistant linings in items for the chemical, petroleum and paper and pulp industries.

### A. M. Lockett — New Orleans

C. C. Crawford, president and secretary of A. M. Lockett & Co., Ltd., for more than 14 years, has been elected chairman of the board of directors and consultant to the company. Robert P. Lockett, Jr. has been elected president to succeed Mr. Crawford.

First employed by A. M. Lockett & Co. in 1905, Mr. Crawford was appointed manager of the Houston office in 1910. He returned to the New Orleans office and was elected secretary of the company in 1919. In 1936, he was elected vice president and secretary of the company and was made president and secretary in 1944.

Mr. Lockett started his career with The Babcock & Wilcox Company as an apprentice engineer in 1937, became assistant sales engineer in the New York office the following year, and later served as B&W representative in the Denver office of the Stearns-Roger Manufacturing Company. In 1946, he joined the New Orleans office of A. M. Lockett & Co. as sales engineer. In 1952, he was made assistant district sales manager, and in 1956 he was elected vice president of the company.

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Oxygen-  
Scavenger  
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Boiler Water  
Treatment

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### New Engineering Firm Dallas, Texas

Hiers Engineering Co. of Dallas, Texas has recently incorporated to include other qualified registered engineers and specialists in the fields of electrical and mechanical engineering. The company specializes in studies, designs, and construction supervision for the production, distribution, and utilization of steam and electric power, for utility, industrial, municipal, and commercial users.

The principals in the company are W. A. Hiers, President and General Manager and J. P. Warren, Vice President.

Mr. Hiers has had a broad background in the engineering fields for over 25 years, including 2 years with

## Reliance Gauge Column Celebrates 75th Anniv.

Serving the steam generating market since 1884, the **Reliance Gauge Column Company** of Cleveland, Ohio is now celebrating its 75th anniversary. Reliance is claimed to be the only manufacturer devoted exclusively to the measurement of water levels for the past 75 years. The company has been headed by President J. Rowland Brown for the past 40 years.



The accompanying cartoon (from a Reliance anniversary bulletin) shows their salesman pacing the industrial area of Cleveland with the first model under his arm. That's

how sales were made in 1886 — looking for smoke stacks, the surest signs of prospects.

By 1921 pressures had reached 350 psi, and Reliance announced the forged steel column. In 1930 their first "special" 1800 psi column was produced and in 1936, the hydrostatic remote reading level indicator. Then in 1954 the use of electrodes to actuate alarms and fuel cutouts, and to start and stop pumps was introduced by Reliance.

First Presbyterian Church of Houston, American Bar Assoc., State Bar of Tex., Houston Bar Assoc., Phi Delta Theta, Board of Governors of Rice Institute, Director of Houston Terminal Warehouse & Cold Storage Co. and of Southwestern Drug Corp.

Also, he was the first president of the Texas Atomic Energy Research Foundation at its formation in April, 1957 and was a Vice-President at the time of his death.

## W. A. Parish Succumbs in Texas

**W. A. Parish**, associated with **Houston Lighting & Power Co.** since 1914 and Chairman of the Board since April, 1958, died at his home in Houston January 23 at the age of 71.

Mr. Parish became chief legal counsel for HL&P in 1914, was elected to the Board of Directors in 1917 and to a vice-presidency in 1927. Following the death of S. R. Bertron in October, 1953, Mr. Parish was elected president, a position held until his rise to the Chairmanship.

Mr. Parish was a member of the

## Mine Safety — Baton Rouge

**Earl J. Finear** has been named sales engineer for the Baton Rouge, La., territory of the recently expanded Technical Products Division, **Mine Safety Appliances Company**, Pittsburgh.

Mr. Finear will provide design assistance and counsel on the installation and maintenance of instruments and process controls for industry in the area. He will also handle sales and engineering service for Ultra-Aire space filters, ventilation equipment and liquid oxygen converters.

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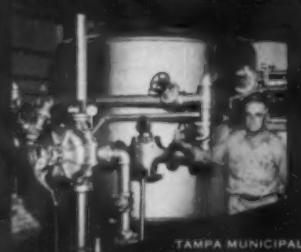
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**Georgia Power —  
Atlanta, Ga.**

James M. Oliver, executive vice president and general manager and a director of the Georgia Power Company, retired from active service January 31 under provisions of the company's pension plan. John W. Lastinger, formerly vice president in charge of public relations and advertising, has been named executive vice president and a director. John F. Pennington, formerly vice president in charge of engineering and operations, was elected vice president and general manager.



the properties of that firm were sold in March, 1957 to the Georgia Power Company, he was elected vice president and Valdosta division manager of Georgia Power. In October, 1957, he was named vice president in charge of public relations and advertising.

A native of Hartwell, Mr. Pennington has been vice president in charge of engineering and operations since 1957.



Mr. Oliver was born in Dadeville, Alabama, and attended Alabama Polytechnic Institute, graduating in 1915 with the degree of bachelor of science in electrical engineering. Shortly after, he joined the Alabama Power Company, where he was employed in the construction and operating departments. In 1916 he was named operating engineer.

He joined the Georgia Power Company in 1927, as operating manager, and in 1944 was elected vice president in charge of operations. He was advanced to vice president and general manager in 1951. On January 1, 1957, he was elected executive vice president and general manager, and on the same date was elected a company director. The veteran utility official has been a director of Southern Services, Inc., since 1953.

Mr. Lastinger is a native of Valdosta and attended Emory University. He joined the Georgia Power and Light Company in 1926 and four years later was promoted to general manager. In 1932 he was named division manager and in 1945 was promoted to vice president and division manager.

In 1950 he became president of Georgia Power and Light; and when



He joined the company in 1918, serving in various capacities in construction and maintenance activities. In 1937 he was named superintendent in charge of wholesale operations. In 1945 he was appointed general superintendent, transmission and distribution.

Mr. Pennington was named operating manager of the company in 1950, and three years later was elected vice president in charge of operations.

## Southern News Briefs (Continued)

### Thermoid Div. of H. K. Porter

The Thermoid Company, manufacturer of industrial and automotive rubber and friction products has become the new **Thermoid Division** of H. K. Porter Company.

Porter's new Thermoid Division will manufacture and market all products formerly made by Thermoid Company and Porter's Quaker Rubber Division, which include such brands as "Thermoid," "Quaker," "Quaker Pioneer," "Amco," "V-T," "Southern Asbestos" and "Aero-duct" rubber and friction products for automotive, aircraft and industrial use. The Division's plants are at Philadelphia; Trenton; Pittsburgh, Cal.; Nephi, Utah; Huntington, Ind.; Danville, Ill.; Charlotte, N. C. and Mexico City.

The new Porter Division is headed by **Warren E. Hill**, former Thermoid president, as Vice President and General Manager; **George Dau-**  
**phinais** as Vice President-Opera-

tions; and the sales organization, by **J. R. Alexander**, Vice President-Marketing; and **E. G. Counselman**, General Sales Manager. The Managers of the twelve sales districts will be responsible for both automotive and industrial products, and will report to three Regional Sales Managers, East, Midwest, and Pacific.

ed Copolymer Rubber & Chemical Corporation, Baton Rouge, as Director of Research and Development, after a number of years with Phillips Petroleum Company.

A. K. Walton, President of Copolymer and Vice President in charge of manufacturing for Sears, Roebuck and Company, commented that Copolymer's current expansion program will greatly increase the present facilities for producing synthetic rubber and should be completed in early 1959.

### CRCC — La.

Dr. Paul G. Carpenter has been named Acting General Manager of **Copolymer Rubber & Chemical Corporation** and is assuming the administrative and operational direction of the Baton Rouge, La. plant. Dr. Carpenter has been Vice President in charge of Research and Development.

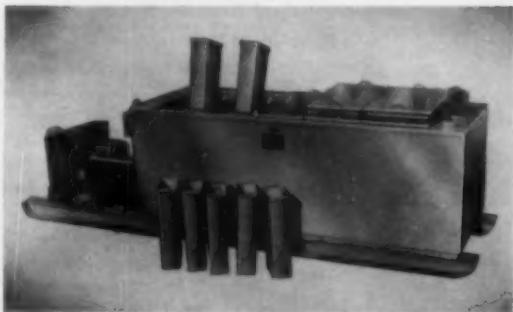
Dr. Carpenter is originally from Salem, Oregon, and is a graduate of the University of Wisconsin. In December, 1956, Dr. Carpenter join-

### AAF — Baltimore

**Machinery & Equipment Sales, Inc.**, 1012 Cathedral Street, Baltimore (telephone: Lexington 9-1311), has been selected to represent **American Air Filter Co., Inc.** for the marketing in the Baltimore area of its air filter, dust control and engine and compressor products. These products formerly were represented by Air Filter Associates.

President of the firm is **C. A. Conklin, III**. Associates are **R. G. Vaughan, Jr.**, and **John P. Johnston**.

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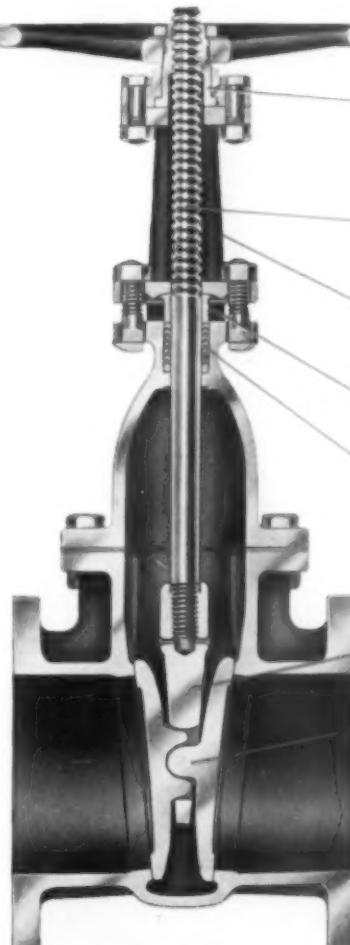
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**YOKE BONNET** has liberal space between yoke arms for easy access to packing box. Precision machined flange face assures uniform contact with gasket for a tight body-bonnet joint.

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**SPLIT WEDGE** is the ball-and-socket design which automatically adjusts to the tapered seating surfaces for positive shutoff. The discs, revolving freely in the wedge carrier, produce a self-cleaning action on seating surfaces and reduce possibility of galling and seizing.

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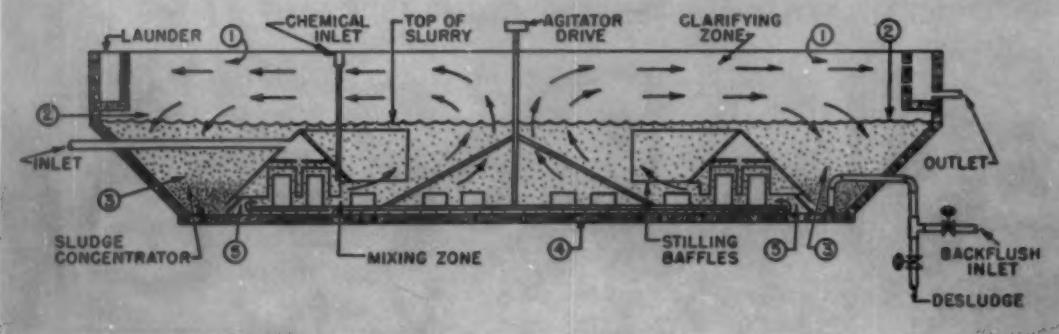
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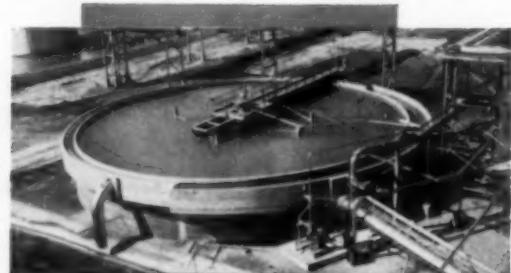
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- ③ Sludge settles only in annular *concentrator* outside of mixing zone. Maximum concentration results because no turbulence is present. This feature saves wastage of water in desludging.
- ④ There is no premature loss of slurry strength in mixing zone because no sludge settles on the floor of mixing zone.
- ⑤ Turbulence in mixing zone assures excellent mixing. A large, full-diameter agitator causes centrifugal outward flow, against the diverting baffle in front of the outer port and turns flow inwardly towards central port.



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